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Water Plant Optimization Study

MITCHELL'S BAY WATER TREATMENT PLANT

December 1990

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Water Plant Optimization Study

Mitchell's Bay Water Treatment Plant

Project No. 7-2029

December 1990

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Please note that some of the recommendations contained in this report may have already been completed at time of publication. For more information, please contact the local municipality, or the Water Resources Branch of the Ministry of the Environment.

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WATER PLANT OPTIMIZATION STUDY
MITCHELL'S BAY WATER TREATMENT PLANT
FINAL REPORT

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REPORT SUMMARY

Background of Study

The Ontario Ministry of Environment has instituted a Water Plant Optimization Study (WPOS) program to determine the optimum treatment strategy for contaminant removal at Ontario Water Treatment Plants (WTP). The WPOS for the Mitchell's Bay WTP was conducted as a part of the ongoing process to provide a continuously updated base of information on the WTP and water quality. In accordance with the detailed protocol prepared by the MOE, four years of daily and monthly operating data were examined in conjunction with present conditions and methods of operation.

Description of Treatment Plant

The Mitchell's Bay WTP is located on the northeast shore of Lake St. Clair. The design capacity of the Neptune Microfloc Aquarius Package Treatment Plant is 1.09 ML/d. The plant employs alum and polymer for coagulation, flocculation, sedimentation, filtration, powdered activated carbon for taste and colour removal, and chlorine for disinfection.

The Mitchell's Bay WTP serves a permanent population of about 200. Due to the St. Clair Region Conservation Authority campground, summer demands are about two times winter demand. The filter effluent turbidity during the study period ranged from 0.1 to 4 FTU and averaged 0.3 FTU.

Due to design deficiencies, the plant has never been able to operate at capacity. The Southwest Region Utility Operations has re-rated the plant at 0.55 ML/d. Problems with mudball formation in the filter and cementing of the filter media are contributing to a further decrease in the hydraulic capacity of the filters and, thus, of the plant.

In general, there is an absence of on-line monitoring equipment and alarms which would permit more operational control of the plant.

Physical Improvements

- Short-term Recommendations

1. The intake pipe should be inspected annually and backflushed, as required, to remove accumulated silt in the intake crib.

2. A 200L alum day tank with provisions for alum dilution with water should be installed. Alum should be injected into the raw water stream from a new injection nozzle located at one third of the pipe diameter. Additional dilution water should be provided at the injection point. Using bagged alum instead of liquid alum should be evaluated.

3. Chemical calibration equipment should be installed on all metering pumps.

4. The chlorine injection point should be moved to the top of the filters. The present location does not allow for chlorination of treated water entering both storage reservoirs.

5. A raw water flowmeter and totalizer should be installed in the low lift pump header.

6. The polymer injection nozzle should be installed in the raw water pipe upstream of the manual raw water flow control valve. Ahead of the polymer addition point, dilution water should be provided via a mixing tee.

7. A high lift pump should be installed in the secondary treated water cell.

8. The raw and treated water turbidity meters should be overhauled and put into service. A high level alarm should be incorporated on treated water turbidimeter.

9. A chlorine residual analyzer and recorder with high and low level chlorine residual alarm should be installed.

10. The mercury filled Flygt float switches are not suitable for potable water use. They should be replaced with level sensors suitable for potable water.

11. Replace mixed media with dual media consisting of 1.1 mm anthracite over 0.4 mm silica sand. At this time, inspect, clean or replace filter underdrains, as required.

12. Repipe surface wash to take water from plant service water (high lift pump header).

13. An air release valve should be installed in the backwash pump discharge pipe to exhaust air in the pump column.

14. Filter hydraulics should be reviewed with the intent on improving hydraulics by installing a siphon or pump discharge to increase present filter rates to the design level.

- Long-term Recommendations

1. The alum storage tank should be removed and dry alum mixed and dosed from the day tank. This would allow room for a second flocculation tank and a new sedimentation tank.

2. A second flocculation tank should be added in series with the existing flocculation tank.

3. A new sedimentation tank should be added which will allow longer retention and thereby provide better settling.

Studies

- Long-term Recommendations

1. The use of coagulants other than alum and coagulant aids should be investigated.

2. Proper methods of preparing the polymer should be investigated and implemented.

Other Recommendations

- Short-term

1. The paddle speed of the flocculator should be increased.

2. Filter backwash times should be increased.

3. Evaluate a streaming current monitor for control of alum dosage.

4. Provide:

   - spectrophotometer for residual aluminum, colour and residual chlorine (total and free),

   - pH meter,

   - glassware, magnetic stirrer and reagents for alkalinity,

   for WTP laboratory.

5. Prepare an Operating Manual.

6. Since chlorine use is small, sodium hypochlorite solution, which is much safer to use than chlorine gas, should be used to replace chlorine gas.

- Long-term

1. The intake structure should be inspected yearly and cleared of silt as required.

2. The filter media should be sampled annually to determine media grain size.

3. All physical plant modifications should be recorded as "As-Constructed" Drawings of the water treatment plant.

4. Existing control levels in the treated water reservoir could be lowered while maintaining the initial design water reserves, to allow a greater working volume.

INTRODUCTION AND TERMS OF REFERENCE

Background

The Ontario Ministry of the Environment has instituted a Water Plant Optimization Study (WPOS), consisting of a continuously updated base of information on Ontario Water Treatment Plants and water quality. In connection with the Drinking Water Surveillance Program (DWSP), a specific plant investigation and process evaluation study are desired for each plant entering the program. The purpose of this study is to document and review the present conditions and to determine an optimum treatment strategy for contaminant removal at the plant. To this end, four years (1983 to 1986 inclusive) of daily and monthly operating data were examined.

Terms of Reference

A detailed protocol for water plant optimization studies has been prepared by the Ministry and distributed to consultants engaged for the optimization studies. A copy of the Terms of Reference is appended (see Appendix I).

This study has been conducted in accordance with the Terms of Reference.

Description

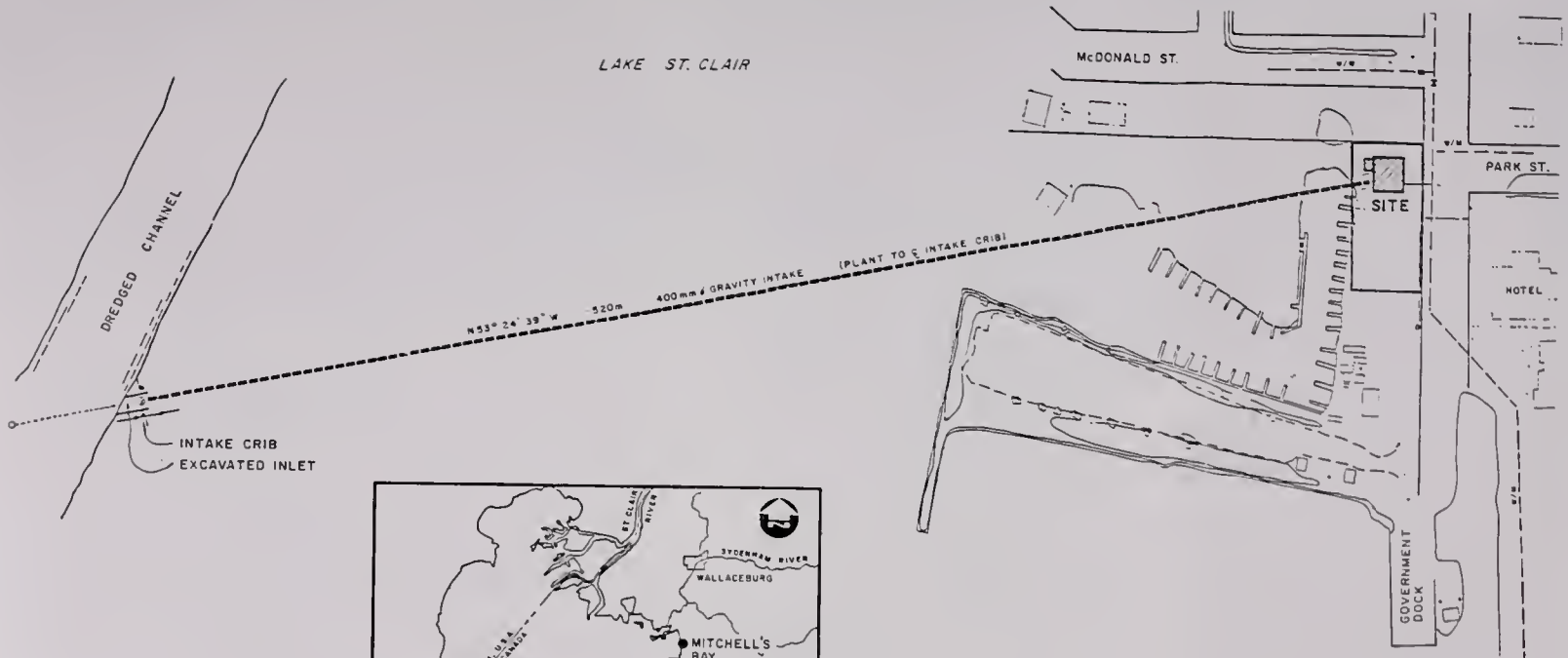
The Mitchell's Bay Water Treatment Plant is a 1.09 ML/d (0.24 mgd) plant located on the eastern shore of Lake St. Clair, as shown on Figure 1. The conventional treatment plant employs:

- alum and polymer for coagulation
- flocculation
- powdered activated carbon for taste and odour control
- a package sedimentation/filtration system

- chlorination for disinfection.

The plant supplies water to a permanent population of approximately 200 people. The summer population is as much as 50 per cent greater than the permanent population. Populations are shown in Table 1.1 in Appendix II.

The plant usually meets the MOE objective of less than 1.0 FTU for treated water turbidity, but seldom meets the MOE Southwestern Region Utility Operation's objective of 0.2 FTU.



LOCATION PLAN

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MITCHELL'S BAY WPOS

SITE PLAN

FIG. No. 1

A. RAW WATER

A:1 Source

The Mitchell's Bay Water Treatment Plant takes raw water from Lake St. Clair about 320m offshore at the southern edge of a dredged channel.

Lake St. Clair, near Mitchell's Bay, is extremely shallow. Raw water quality is affected by wind direction as well as by run-off from municipal drains.

St. Clair River, the Sydenham River, and a number of small creeks drain into Lake St. Clair. Industrial discharges and sewage treatment effluent are carried by the St. Clair River into Lake St. Clair. Chemical spills from petrochemical and chemical industries along the St. Clair River have been a problem for some water treatment plants downstream of the "Chemical Valley".

On occasion, the Mitchell's Bay WTP has been advised to close due to a spill. However, since the WTP draws water from a relatively isolated bay on the lake, it is not usually affected by spills to the St. Clair River.

The Sydenham River runs through farming communities before emptying into Lake St. Clair. It is probable that the Sydenham may carry agricultural runoff, potentially containing pesticides and animal excrement, into Lake St. Clair.

In the summer, there are many pleasure boats on the lake. There is a potential for lake contamination by boaters who illegally dump raw sewage into the lake.

A:2 Quality

Conventional raw water parameters for the years 1983 to 1986 were as follows:

	Average	Range
Turbidity	16	0.8 - 230
Colour (TCU)	20	5-60
Temperature (°C)	-	3-27
Alkalinity (mg/L$CaCO_3$)	105	70-120
Hardness (mg/L$CaCO_3$)	140	80-270
pH	8.1	7.5-8.9

Raw water turbidities are generally low during the high demand summer season. The high turbidity episodes (in spring, usually March or April) last about one week, depending on duration and severity of storms.

Recorded raw water temperatures in winter are higher than expected and may be in error due to sampling. Temperatures in summer exceed the desirable limit of 15°C (cool water enhances palatability) from mid-June to the end of October.

Over the four-year period of record geometric means for bacteriological analyses were as follows:

Total Coliform:	36/100 mL
Fecal Coliform:	47/100 mL
Fecal Streptococcus:	3/100 mL

Bacteria may be from raw sewage dumped into the lake by boaters, agricultural run-off carrying animal waste, or sewage effluent carried into the lake from a river discharge.

Contaminant monitoring was conducted under the Drinking Water Surveillance Program (DWSP) for chemicals including metals, organochlorines and pesticides which may be in the lake water as a result of industrial discharges or spills or from agricultural runoff.

Results for the years 1983 to 1986 show raw water concentrations for contaminants monitored to be below Drinking Water Objectives. The exception is raw water iron concentrations. Maximum and average concentrations of 1.60 mg/L and 0.47 mg/L were observed in 1986 and of 3.00 mg/L and 0.68 mg/L were observed in 1985. After treatment, iron concentrations were reduced to well below the Drinking Water Objective of 0.3 mg/L. Contaminants monitored in the DWSP and their respective concentrations are documented on Table 4 in Appendix II.

B. FLOW MEASUREMENT

TABLE A

FLOW METERING EQUIPMENT

Service	:	Treated water
Type	:	Rockwell Turbometer
Model	:	W-350 DR
Primary Element	:	Rotor operated magnetic drive
Diameter	:	75 mm
Operating Range	:	0.027 to 1.9 ML/d (5-350 gpm)
Accuracy	:	100% $\pm$ 1.5% of actual throughput

There is only one flowmeter in the Water Treatment Plant. This meter measures treated water pumped to the distribution system. The treated water meter is a 75 mm Rockwell W350 calibrated in imperial gallons and registers to the nearest 45.4L (10 imperial gallons). The meter was calibrated about three years ago. An accuracy of 95 per cent was obtained.

Backwash water is taken as a constant from manufacturer's literature at 7 m^3 per backwash.

All other in-plant uses of water are assumed negligible.

Raw water flows recorded by the operator are daily treated water pumpage plus backwash water used.

C. PROCESS COMPONENTS

C:1:a General

The plant is a conventional water treatment plant employing a Microfloc Aquarius 40 sedimentation and filtration unit. The WTP consists of:

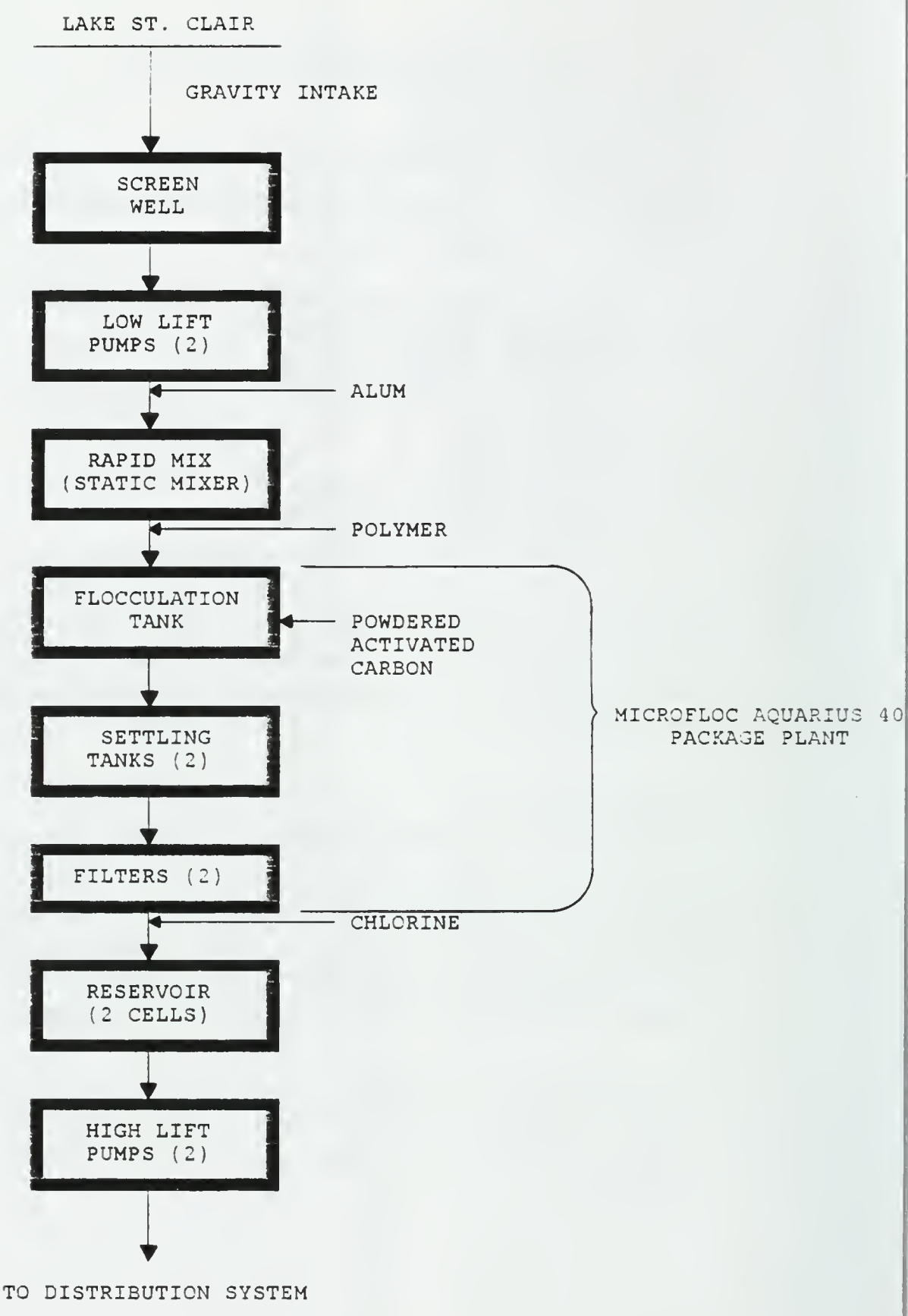
- gravity intake from Lake St. Clair
- manually cleaned screens
- low lift pumping
- coagulation using liquid alum and polymer
- rapid mix using an in-line static mixer fabricated by plant staff
- flocculation
- sedimentation) Microfloc AQ40
- mixed media filtration)
- disinfection by chlorination
- treated water storage
- high lift pumping into a closed distribution system.

The plant processes are shown as a Block Flow Schematic on Figure No. 2. A Process and Instrumentation Schematic is shown on Figure 3. Photographs of the plant may be found in Appendix III.

C:1:b Controls

The plant is automatically started and stopped based on treated water levels in the reservoir (see Figure 4 for layout). The water levels are sensed by Flygt float switches. The control panel is part of the Microfloc Package Treatment Plant, and controls on-off operation of the selected low lift pump and chemical feed systems.

The Package Water Treatment Plant Control Panel provides programmed backwash of the filters. Backwash is initiated either automatically on attaining terminal head loss or manually.



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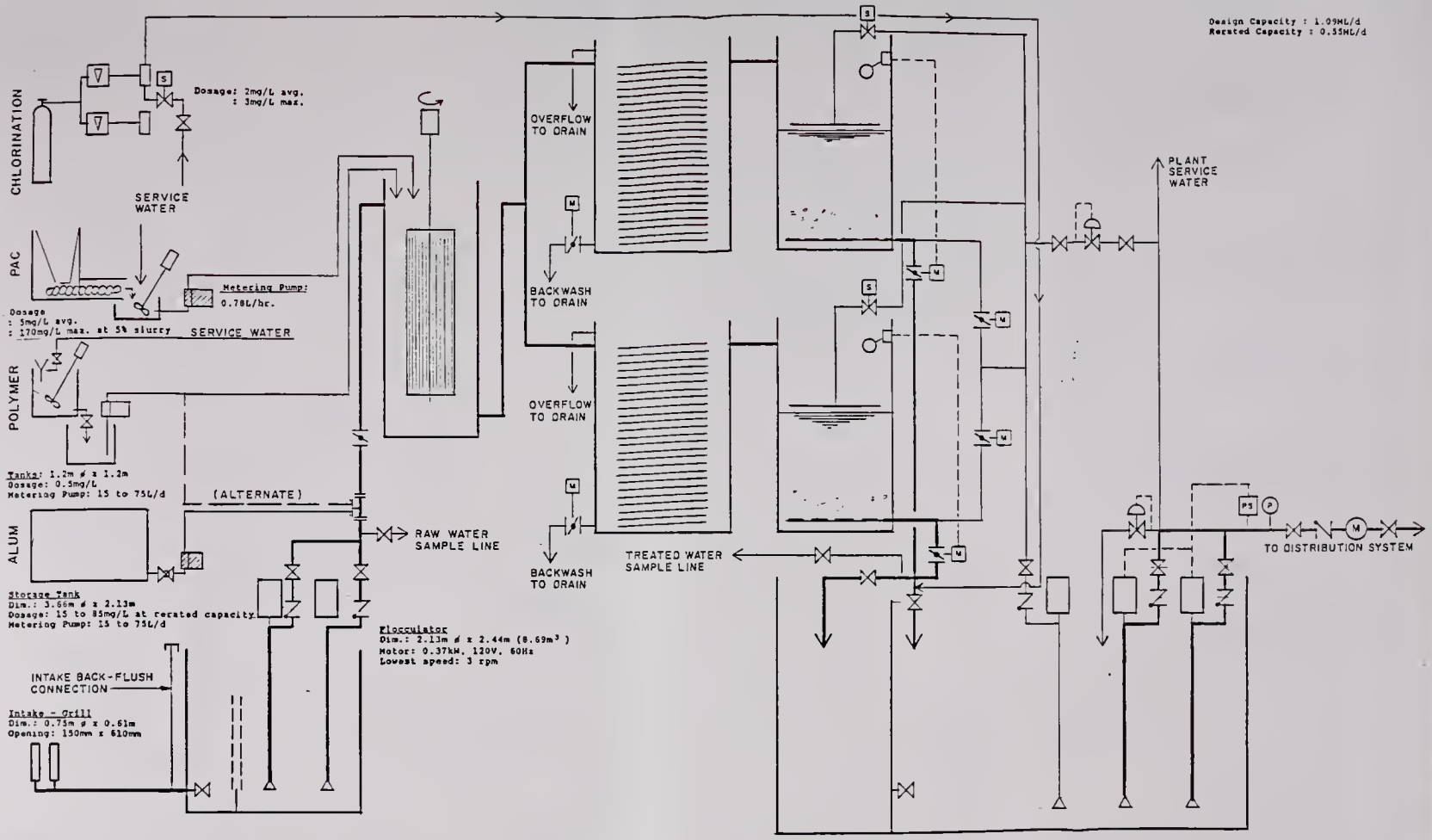
MITCHELL'S BAY WPOS
W.T.P.
BLOCK FLOW
SCHEMATIC

FIG



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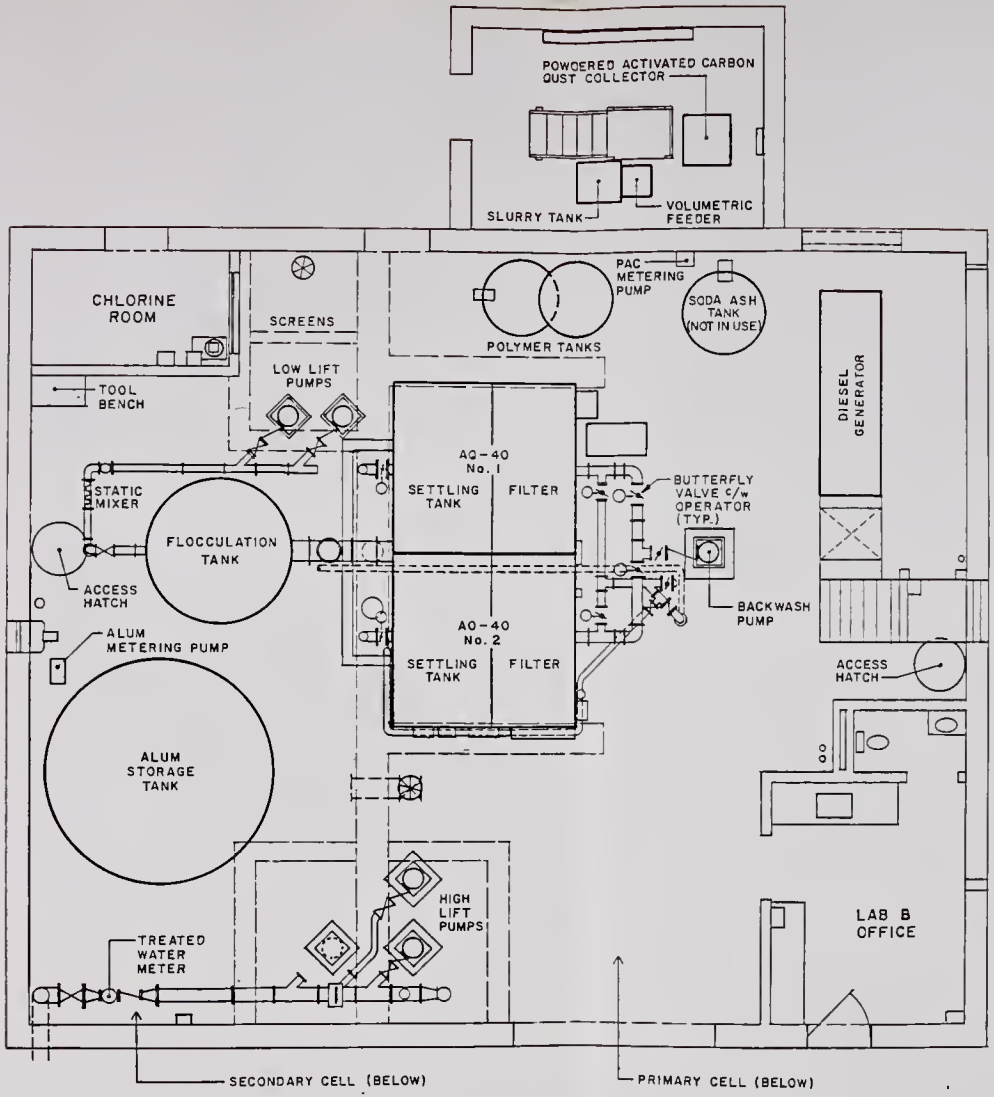
PROCESS & INSTRUMENTATION

FIG No. 3



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WATER TREATMENT PLANT LAYOUT

FIG. No. 4

Raw water flow rate to the treatment units is controlled by a manual butterfly valve in the low lift pump piping upstream of the flocculation tank. Note that there is no flow rate indicator to aid regulation of raw water flow.

All chemical systems dose at manually set rates when the Package Treatment Plant is on.

The smaller high lift pump is wired to run continuously as the permanent duty pump. The second pump is controlled by pressure switches and cannot be manually selected. When the distribution system pressure falls to 310 kPa, the second pump starts and runs until system pressure increases to 415 kPa, at which point the second pump switches off. It is reported that the second pump does not automatically start when the duty pump is switched off.

C:2 Design Data

C:2:a Capacity

The design capacity of the Package Treatment Plant is 1.09 ML/d. However, due to design deficiencies in plant piping, the Package Treatment Plant has never been able to produce water at the design rate. The plant has been re-rated by the Southwest Region Utility Operations at 0.55 ML/d. The low lift pump discharge is throttled.

Maximum day demand during the four years of record was 0.237 ML/d. A summary of flow data during the four years is provided in Table 1.0 of Appendix II.

Summer water demands (both average day and maximum day) are about twice the corresponding winter demands. Part of the summer increase in demand is due to the St. Clair Region Conservation Authority campground. The summertime high

demand period coincides with favourable conditions for water treatment; they are low raw water turbidity and high water temperatures.

C:2:b Plant Capacity Limitations

The Package Treatment Plant is not capable of treating the design flows, i.e., the plant cannot physically handle a flow of 1.09 ML/d nor can it produce the desired filter effluent turbidity at flows greater than half the plant's design capacity.

It is reported that the package plant has never been able to treat more than 0.55 ML/d (5,000 gallons per hour) without overflowing the treatment units. The overflow is due to the inability of the filters to handle more than 6 m^3 per hour per m^2 of filter area (2.5 USgpm/ft^2). The Microfloc filters are shallow tanks, with total depth of water of 1.6m (450 mm of water above the top of the filter media). The filters rely on a siphon discharge to produce part of the filtering head. Typical installation would have a siphon leg with a 1.6m vertical drop in the filter discharge piping. Neither original construction nor subsequent modifications to the filter discharge piping have provided the filter discharge pipe configuration required by the manufacturer.

Plant staff have found that the Package Treatment Plant is not capable of producing filtered water turbidities of less than 0.2 FTU (Southwest Region objective) at plant throughput greater than 0.55 ML/d. Large, slow settling floc is carried over from the sedimentation tanks to the filters even at the reduced flow of 0.55 ML/d (original design capacity was 1.09 ML/d). A combination of factors is responsible:

- Addition of alum and polyelectrolyte at the same dosage point. Alum must be dosed upstream of polyelectrolyte (alum coagulation must precede flocculation using polyelectrolyte). At low water temperatures, reaction time for alum coagulation may be more than 10 minutes.

- The single-stage backmix flocculator tank provides ineffective flocculation. Ideally, flocculation should be carried out in a plug flow reactor. In later models of the Microfloc Aquarius Package Plants 2-stage flocculation was provided to more closely approximate plug flow flocculation.

- The flocculation tank is too small, especially for a backmix flocculator.

- The flocculator is run at very low speed, producing a light voluminous floc. The floc is easily carried through the settler tubes to the clarifier effluent.

- The floc is fragile, and at filter loadings above 6 m/hr, breaks through the filter producing a turbid effluent.

C:3 Process Component Inventory

C:3:a Intake

- Location: 320m offshore at southern edge of dredged channel

- Crib:
  - Timber crib, rip-rapped all around - 4.5m x 3.0m x 1.4m
  - 1.8m water depth over crib
  - Located in excavated pocket off the dredged channel
  - Top of crib at or below existing lake bottom

- Intake:
  - Two vertical cylindrical FRP intake grills 0.75mØ x 0.61m high
  - Opening size 150 mm x 610 mm
  - Average entrance velocity @ WTP design capacity = 0.075 m/s

- Pipe:
  - 520m of 400 mm (nominal) Series 60 polyethylene pipe (actual id = 366 mm)
  - Volume of pipe 55 m^3
  - Flow velocity @ WTP design capacity 0.150 m/s
  - Gravity flow to low lift wet well

- Backflush connection provided outside WTP Building.

The top of the timber intake crib is currently (March 1989) just 0.6m below the lake surface, as shown in Figure No. 5. The crib and the dredged approach to the crib from the channel could silt. The intake is shallow and, therefore, may have been damaged by ice or dragging anchors.

Frazil ice is not known to be a problem. Frazil ice is associated with turbulent flow. Since intake velocities are low, turbulence would be weak or non-existent and, therefore, frazil ice crystals could not be drawn into suspension.

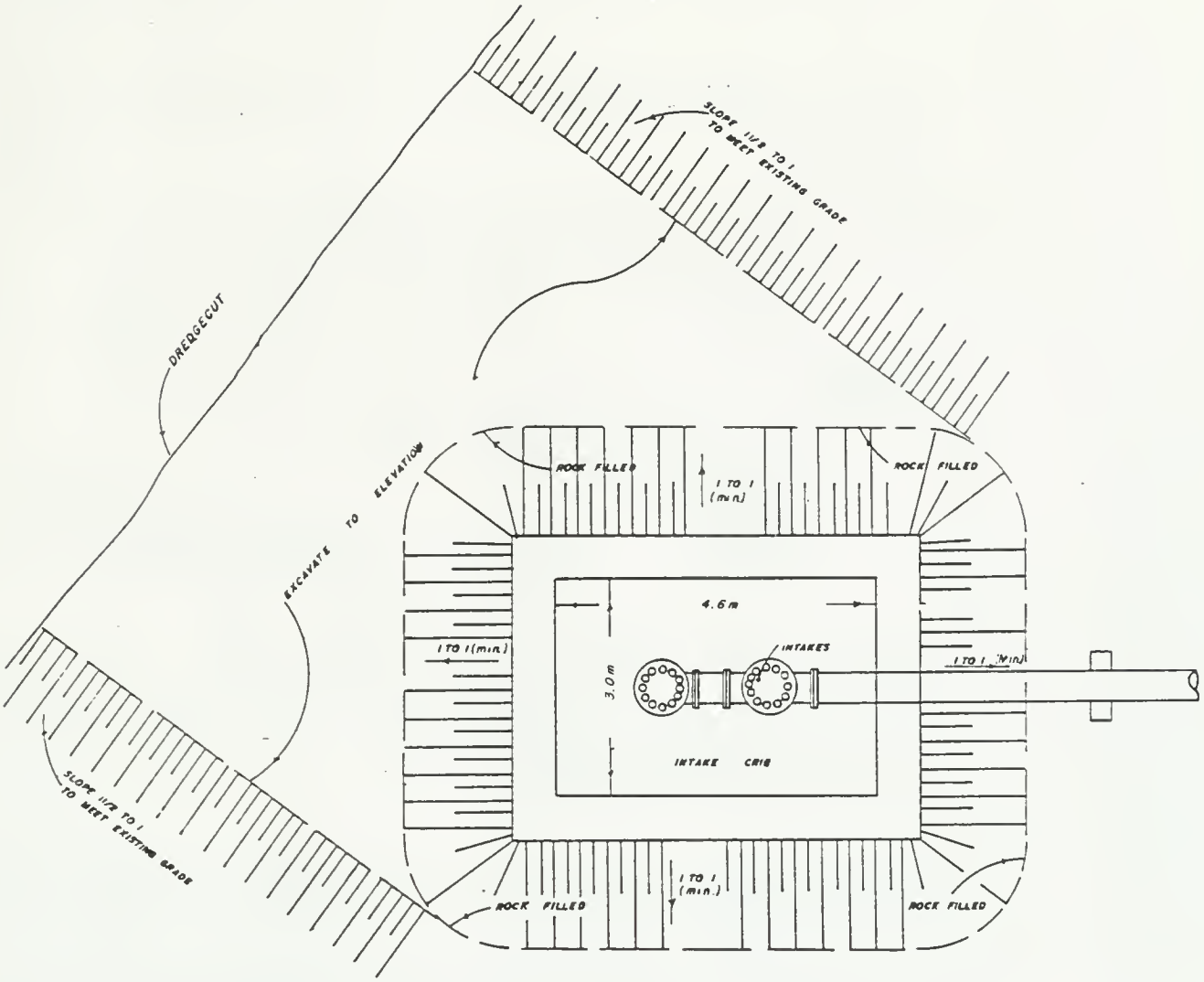
C:3:b Screening

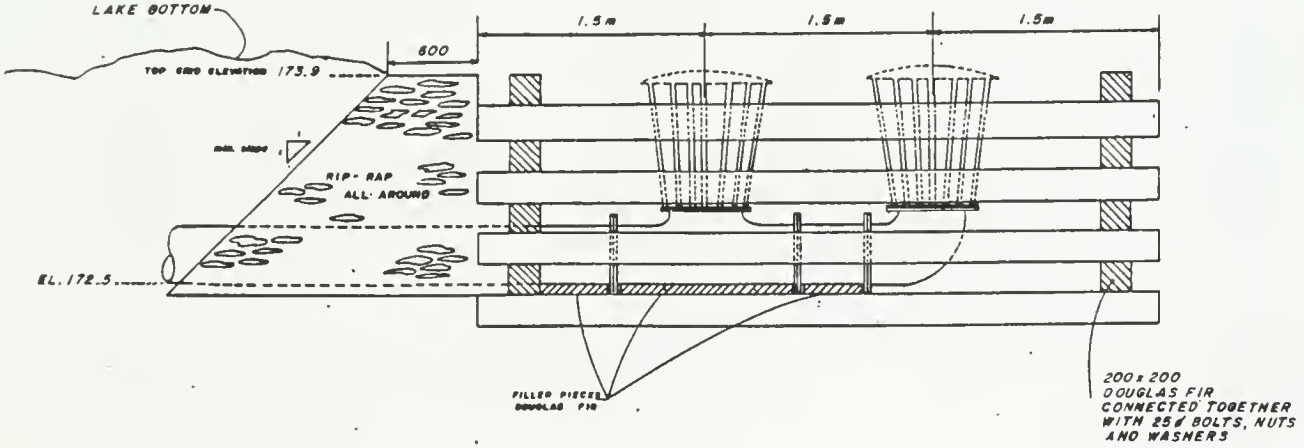
- Location: In low lift wet well

- Two manually cleaned screens in series, each 1.83m x 1.30m with 4.8 mm bars spaced to provide 6 mm square clear openings

- Material: Galvanized steel

The screens are heavy and hence not removed frequently for cleaning.





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INTAKE

FIG. No. **5**

C:3:c Low Lift Pumping

Wet Well

- 1.37m x 2.53m x 5.46m deep concrete wet well
- Volume = 18.9 m^3
- Average water depth 4.27m.
- Retention time = 25 min at 1.09 ML/d, 50 min at 0.55 ML/d

Pumps

- Two vertical turbine pumps
- Crane Deming Figure 4700 with above floor 100 mm discharge head
- Capacity: 12.6 L/s (1.09 ML/d) @ 150 kPa
- Motor: US Electric Motors, 3.7 kW, 1750 rpm, 575V, 3 phase, 60 hertz

The two pumps alternate duty automatically. Only one low lift pump can run at any time. On-off operation of the low lift pump is controlled by Flygt float switches in the treated water reservoir.

The raw water is pumped through approximately 7m of 100 mm diameter pipe to the top of the flocculation tank.

A flow rate of 0.4 ML/d is controlled by a manual butterfly valve upstream of the flocculation tank inlet.

C:3:d Flash Mixing

Mixing is provided by one 100 mm diameter static mixer approximately 1m long. The static mixer was fabricated by plant staff and is described as "steel plate welded to a central 30 mm pipe". The static mixer is inserted into the 100 mm raw water pipe just downstream of the chemical injection tee.

C:3:e Flocculation

Tank

- One painted steel vertical cylindrical tank 2.44m high x 2.13m diameter
- Water depth: 2.23m
- Total tank volume: 8.69 m^3
- Water volume: 7.95 m^3
- Displacement time:
  - at design capacity (1.09 ML/d): 10.5 minutes
  - at actual capacity (0.55 ML/d): 21 minutes

Flocculator

- Vertical paddle
- Drive:
  - Motor: Gryphon AC motor, frame 56/812, 0.37 kW, 120V, 60 hertz
  - Speed Reduction:
    - 38 mm, 50 mm, 75 mm and 100 mm drive pulleys to 150 mm driven pulley on gear reducer
    - Gear reducer: Winsmith 4CVD
    - Lowest speed: 3 rpm.

The flocculator is currently being run at its lowest speed. Calculated velocity gradient is 4 sec^{-1}. At current raw water flow rates of 0.4 ML/d (3,500 Imp. gal± per hour), Gt = 7000 approximately. This compares to Gt of 22 000 at design flow rate and maximum flocculator speed.

The flocculated water exits the flocculation tank at the bottom and is gravity piped to the sedimentation tanks of the Microfloc Package Plant.

C:3:f Sedimentation

The sedimentation compartments (2) form part of the Microfloc AQ40 Package Water Treatment Plant. The Package Water Treatment Plant is a four-compartment steel tank 4.88m x 2.44m x 1.83m high. The treatment plant provides two parallel sedimentation and filtration trains.

Description of the sedimentation portion is as follows:

- Number of tanks: two (2)
- Size: 2.44m x 1.68m x 1.62m water depth (each)
- Volume: 13.3 m^3 (total, both tanks)
- Retention time: 17.6 min at design capacity (1.09 ML/d), 35 min at actual capacity (0.55 ML/d) - both tanks
- Tube settlers: Horizontal (3°) tubes of 50 mm split hexagon formed sheets; length of settler tube = 1.00m
- Settler tube area:
  - Plan: 4.88 m^2
  - Total projected tube area: 156 m^2
- Overflow rate 4.85 $L/m^2/min$ (design), 2.45 $L/m^2/min$ (actual)

Settled sludge is removed from the horizontal settler tubes by backflushing during filter backwash.

The retention time of 17.6 min is based on design capacity and the volume of both tanks. The retention time is considered adequate for settling well flocculated water since solids only have to travel a short distance, 50 mm or less, to the bottom of the settling tubes. However, since water is not well flocculated, the sedimentation tanks are too small to provide the additional retention necessary to complete chemical reactions and to flocculate the particles.

"Overflow rates", i.e., surface settling rates based on total projected settler tube area is in the range of surface loadings normally used for plain (no settling tubes) sedimentation tanks.

The sedimentation units are adequate to settle well flocculated water under summer (warm water) conditions.

C:3:g Filters

The filters are in the second compartment of the two parallel sedimentation and filtration trains of the AQ40 Package Treatment Plant. Description of the filters is as follows:

- Number of filters: two (2)
- Filter size, each 2.44m x 0.76m x 1.62m water depth
- Total filter area: 3.71 m^2
- Volume of filter compartments: Total (both compartments, no media): 6.01 m^3
- Design filter rate - 12.2 m/hr (5 USgpm/ft^2)
- De-rated filter rate - 6.1 m/hr (2.5 USgpm/ft^2)
- Actual filter rate at current production rate of 0.4 ML/d is 4.5 m/hr
- Constant level filters. Level control by Fisher Leveltrol modulating pneumatic butterfly valve (one for each filter compartment)
- Proprietary mixed media - total depth of media 1.21m comprising:
  - 0.46m of 1.1 mm ES anthracite (SG = 1.5)
  - 0.23m of 0.4 mm ES silica sand (SG = 2.6)
  - 0.08m of 0.2 mm ES garnet sand (SG = 4.2)
  - 0.08m of 1.6 mm x 3.2 mm ilmenite gravel
  - 0.08m of 4.8 mm x 9.5 mm silica gravel
  - 0.08m of 9.5 mm x 19 mm silica gravel
  - 0.20m of 19 mm x 38 mm silica gravel
- Perforated pipe lateral underdrain
- Fixed nozzle surface wash

The filter's shallow tank is designed to operate with a siphon discharge of filtered water, although a siphon discharge was never installed at Mitchell's Bay. By design, water would not only be driven through the filter by the pressure of the water lying over the media, but also by suction pressure in the filter discharge pipe. Two major disadvantages of a siphon discharge filter are its susceptibility to air-binding and the need to maintain the siphon.

Filter influent turbidity is not monitored.

Filter effluent turbidity during the study period ranged from 0.1 to 4 FTU and averaged 0.3 FTU. Filter effluent turbidity is based on one grab sample per day. Turbidity is measured in the laboratory using a Hach 2100A turbidimeter. An on-line filter effluent turbidimeter (Hach Model 1720) is provided, but has never been used after the sample pump ran dry and burned out.

Filter runs, based on running time only, varies from about six hours to ten hours. Filters are manually backwashed once or twice weekly in winter, and automatically (on head-loss) as required in summer. The long interval between filter backwashes in the winter is due to low water usage. Water filtered per cycle is in the range of 35 to 60 m^3/m^2 (i.e., 65 to 110 m^3/filter).

Backwash flow rate is 24m/hr.

Backwash water used is 7 m^3 per backwash. Additional water wasted on filter backwashing includes:

- surface wash estimated at 0.4 m^3/backwash
- contents of clarifier, 6.6 m^3/backwash
- overflow of raw water 1.1 m^3/backwash.

The backwash water and the surface washwater have been filtered. The clarifier contents and raw water overflow have been chemically dosed.

Total water to waste averages 10 per cent of treated water produced, and is documented as a total per month in Table B.

Backwash

Instrumentation is provided to automatically initiate backwash on head loss.

One backwash pump is installed. The pump is:

- Manufacturer: FMC Peerless
- Type: Vertical turbine, size 6 x 6 x 12
- Capacity: 22.7 L/s @ 167 kPa
- Motor: US Electric, 7.5 kW, 1750 rpm.

Pump draws treated water from the primary cell of the treated water reservoir.

MITCHELL'S BAY

TABLE B MONTHLY WASTEWATER USAGE

MONTH	1986		1985		1984		1983	
	WASTE-WATER FLOW (m^3)	% OF TREATED WATER	WASTE-WATER FLOW (m^3)	% OF TREATED WATER	WASTE WATER FLOW (m^3)	% OF TREATED WATER	WASTE WATER FLOW (m^3)	% OF TREATED WATER
JAN	211	11.4	287	17.5	132	8.2	235	19.6
FEB	211	12.5	121	8.6	166	10.8	119	10.4
MAR	302	17.5	211	14.2	242	17.0	73	5.8
APR	151	8.2	227	14.2	181	10.4	119	8.8
MAY	242	7.6	166	5.4	211	8.0	162	7.3
JUN	272	8.2	211	6.0	211	5.6	192	5.8
JUL	272	6.3	362	7.8	317	6.5	235	5.2
AUG	362	8.6	332	8.0	227	5.6	205	5.4
SEP	332	10.6	272	8.6	227	9.5	162	5.8
OCT	332	13.2	211	7.3	136	6.9	132	7.6
NOV	242	13.2	242	13.2	121	8.4	119	8.4
DEC	302	17.3	332	18.3	151	10.1	235	13.2
TOTAL	3231	134.4	2974	129.1	2322	107.0	1988	103.3
MONTHLY AVERAGE	269	11.2	248	10.8	194	8.9	166	8.6

NOTE: Wastewater includes: Filter Backwash Water
Surface Washwater
Sludge from Settler Tubes in Sedimentation Tank
Flocculated water to sedimentation/filtration train

SOURCE: WTP Utility Monitoring Records, Sheet B5

Surface washwater is obtained from the high lift pump header. On-off control is by solenoid valves.

Emergency backwash is provided by connection to the high lift pump header. The connection is equipped with a pressure reducing valve.

Backwash using a high pressure source, even with a pressure reducing valve, is not recommended by current MOE Design Guidelines.

The backwash pump runs only 20 to 35 hours per year and, combined with good preventive maintenance, has enabled the pump to provide uninterrupted service. Considering the existing pump's record of service and the more urgent need for other plant modifications, we feel that provision of a second backwash pump is not a high priority item.

The pressure reducing valve should be checked for proper operation as part of the plant's preventive maintenance program.

If emergency backwash must be used, an operator must be present to monitor and control, if necessary, backwash operation including backwash water pressure, bed expansion and media loss.

Treated Water Reservoir

- Location: Below WTP Building
- Number of cells: Two (2)
- Total volume: 215 m^3 to high operating level
- Primary cell:
  - Dimensions: 11.58m x 8.58m x 1.37m water depth
  - Volume: 136 m^3

- Secondary cell:
  - Dimensions: 11.58m x 4.98m x 1.37m water depth
  - Volume: 79 m^3

- Control elevations: see C:3:c Low Lift Pumps

- Level switches: Flygt ENH-10

C:3:h High Lift

Pump Wells:
- Two 2.44m x 1.60m x 1.83m deep, volume = 2 x 7.14 m^3

Pumps:
- Manufacturer: Crane Deming Figure 4700

- Number and type: Two vertical turbine pumps

- Duty pump (HL No. 1)
  - Capacity: 7.6 L/s (0.66 ML/d) @ 380 kPa
  - Motor: US Electric 5.6 kW, 1750 rpm

- Stand-by pump (HL No. 2)
  - Capacity: 15.2 L/s (1.3 ML/d) @ 380 kPa
  - Motor: US Electric 11.2 kW, 1750 rpm

Pump Controls:
- Duty pump connected to run at all times.

- Stand-by pump controlled by pressure switch, to start at low pressure as described in Section C:1:b.

- High lift pump shutdown on low reservoir level.

The high lift pumps pump water into a closed distribution system. A pressure relief valve is provided, discharging into the treated water reservoir.

Both high lift pumps draw from the primary cell.

C:3:i Backwash Water Treatment and Sludge Disposal

Normally, clarifier sludge is flushed from the settler tubes as a step in the filter backwash sequence. During long periods between filter backwashes, the settler tubes fill up and as a result settled floc is carried over onto the filter. To remedy this, plant staff have reprogrammed the backwash program, adding a backwash for the settler tubes alone every three hours of operation.

The combined clarifier sludge and backwash water are discharged directly to a sanitary sewer.

C:4 Chemical Systems

Alum

- Type: Bulk liquid alum, 48.5%
- Storage Tank:
  - Materials of construction: FRP
  - Dimensions: 3.66m diameter x 2.13m high
  - Volume: 22 m^3
- Day tank: None provided
- Metering pump: One Wallace & Tiernan (W&T) 94-330 (470 L/d)
- Capacity:
  - Maximum 75 L/d
  - Minimum 15 L/d
- Dosage point: In low lift discharge pipe. Injection is at a tapping into a blind flange on a 100 mm tee upstream of a static mixer
- Dosage at 0.55 ML/d:
  - Maximum 85 mg/L $Al_2(SO_4)_3 \cdot 14H_2O$
  - Minimum 15 mg/L $Al_2(SO_4)_3 \cdot 14H_2O$
- Control: On-off with low lift pump. Dosage rate manually selected by changing stroking rate.

Polymer

- Type: Calgon 233
- Mixing tank: 1.2m diameter x 1.2m painted steel
- Aging tank: 1.2m diameter x 1.2m painted steel
- Metering pump: Two Wallace & Tiernan 94-330
- Capacity:
  - Maximum 75 L/d
  - Minimum 15 L/d
- Dosage point: Originally same as alum. Alternative point at top of flocculation tank
- Control: On-off with low lift pump. Dosage rate manually selected

Powdered Activated Carbon

- Bagged carbon
- Automatic slurry make-up with Wallace & Tiernan volumetric feeder feeding a slurrying tank with 0.19 kW mixer
- Metering pump: One prominent META HM20-56C (maximum capacity 78 L/hr)
- Dosage point: Into flocculation tank
- Dosage:
  - Maximum 170 mg/L at 5 per cent slurry
  - Average 5 mg/L
- Control: On-off with low lift pumps. Dosage rate manually selected

Chlorine

- 70 kg chlorine cylinders
- Chlorinators: Two W&T 91-100A with 1.3 kg/d rotameters
- Only one chlorinator (post filtration) is set up. The other, intended for prechlorination, has no injector or solution tubing
- Dosage point: In filter effluent pipe

- Dosage:
  - Maximum 3 mg/L
  - Average 2 mg/L

- Control:
  - Chlorine cylinder weigh scale
  - On-off with low lift pump. Dosage rate manually set

C:5 Sampling

Sample	Source	Sample Pipe (dia/L)	Flow	Velocity	Travel Time (min)
Raw Water	L.L. Header	13 mm/2.7m	1L/min±	12 cm/s	0.5
Filtered Water	Filter Disch Pipe	13 mm/0	1L/min±	-	-
Treated Water	H.L. Disch Pipe (PLT Service Water)	19 mm/13m	2L/min±	12 cm/s	2

All sample lines are copper.

All sampling is manual. Raw water is sampled at the low lift header. Filtered water is sampled at the filter discharge. Treated water is sampled in the laboratory from the plant service water supply.

C:6 Process Automation

The treatment plant is controlled by a control panel supplied with the Package Treatment Plant. The control panel responds to treated water reservoir levels, turning the plant, low lift pumps and chemical systems on at elevation 176.02m (0.61m below overflow), and off at elevation 176.48m (0.15m below overflow).

Level controllers modulating filter effluent butterfly valves maintain a constant level in the filter compartments.

Backwash (and surface wash) can be initiated on head loss. The backwash sequence is programmed on a cam timer.

During backwash, flows to that treatment train are discharged along with backwash water.

The duty high lift pump runs continuously. The stand-by pump starts on low pressure, sensed by a pressure switch and shuts down on preselected high pressure (as described in Section C:1:b).

The reservoir level controls provide lockout of the backwash pump and high lift pump at low reservoir levels. The pumps reset automatically when reservoir water level rises. Control levels and alarms in the reservoir are:

-	Overflow:	176.63m
-	Plant stop:	176.48m
-	Plant start:	176.02m
-	Reset backwash pump:	176.56m
-	Reset H.L. pumps:	175.41m
-	Backwash pump shutdown:	175.26m
-	Low level alarm:	175.26m
-	H.L. pump shutdown:	175.11m
-	Bottom of reservoir:	174.96m

Since converting the former backwash holding tank to a secondary reservoir cell, the plant start level has been lowered to the 176.02m level, providing about 68 m^3 storage between "Plant On" and "Plant Off".

C:7 Stand-by

All functions of the plant can be run off the stand-by power generator. Description of the generator is as follows:

- Generator: Newage Stafford Type 640A
- Capacity: 125 kVA, 600/347V, 60 hertz, 3 phase
- Driver: Dorman Diesel

D. PLANT OPERATION

D:1 General Description

- General

The Microfloc AQ40 Package Treatment Plant consists of:

- Flocculation in a single compartment vertical cylindrical tank with a paddle stirrer.

- Sedimentation using horizontal settler tubes. The settled sludge is backflushed from the tubes during filter backwash.

- Proprietary mixed media filters.

Operation of the plant is "on-off" depending on treated water reservoir levels. The normal operating band is 0.46m, providing about 68 m^3 between "Plant Off" and "Plant On" levels.

Water demands are low in winter, averaging 60 m^3/d. Summer demands are three to four times the winter demand. The low winter demand coincides with difficult-to-treat water, that is water with low temperature and high turbidities.

The treatment plant is incapable of producing the original design capacity of 1.09 ML/d. Even the re-rated capacity of 0.55 ML/d cannot be met. Plant throughput capacity has steadily declined indicating cementing of filter media particles or mudballs reducing the effective filter area.

- Operation

The Water Treatment Plant is operated as a satellite of the Wallaceburg WPCP. It is staffed two to four hours per day (including travel time) depending on the number of filters to be backwashed, chemical solution make-up, etc.

When staff are not at the Water Treatment Plant, an alarm signal on low treated water reservoir level is transmitted via a dedicated telephone line to the Wallaceburg WPCP.

All monitoring and data collection is manually done by the operator.

- Chlorine used is recorded once per month because the low chlorine usage (5-10 kg/month) makes daily readings of the chlorine weigh scale futile.

- Alum use is calculated based on calibrated metering pump setting and plant running time. Metering pumps were calibrated in 1986. Previously used calibration curve, supplied by pump vendor, is not believed to be accurate. Therefore, the validity of alum dosages recorded prior to 1986 is questionable. This explains the large difference in dosages between 1986 and the three previous years.

  There is no day tank. The drop in bulk storage tank level is so small that even monthly measurement is inaccurate.

- Chlorine residual is measured once daily, analyzing for total residual chlorine in water pumped to the distribution system using a DPD comparator.

- Turbidity is measured once daily on grab samples on raw, filtered and treated water.

- Treated water pumpage is measured daily from the treated water meter register (raw water flow, as recorded, is the total of treated water plus backwash water used).

Samples are taken once weekly and submitted to MOE, London Laboratory for bacti analyses.

Routine chemical samples of raw and treated water are taken monthly.

Plant security has not been a problem since the plant was commissioned in 1976. The plant has no windows and access doors have two locks.

D:2 Flow Control

- Low Lift Pumps

The selected low lift pump starts and stops automatically on treated water reservoir level.

Only one low lift pump can run at any one time (even on "Manual"). The two pumps alternate on each start.

Rate of flow to downstream treatment units is throttled by a manual butterfly valve. There is no raw water flow indicator available.

- High Lift Pumps

The high lift pumps pump into a closed system. One pump (the 7.6 L/s pump) runs continuously. During low flow periods, water is bled back from the distribution header to the treated water reservoir through a pressure relief valve.

The second pump starts on low system pressure and runs until discharge pressure increases to 415 kPa.

- Sedimentation and Filtration

The rate of flow of raw water is controlled by a manual butterfly valve upstream of the flocculation tank (see Low Lift Pumps above).

Raw water flow rate is throttled to prevent overflow of flocculated water at the sedimentation basin inlet.

During backwash of a filter, raw water normally directed to that filter, is discharged along with backwash water, maintaining (more or less) constant filtration rate on the remaining filter.

D:3 Disinfection Practices

The only point of disinfectant addition is at the filter effluent piping (i.e., post-chlorination). The chlorination point is downstream of the Y-bend take-off for effluent discharge to the secondary cell. Thus, only filter effluent to the primary cell can be chlorinated. If the filter effluent is directed to the secondary cell, it will be chlorinated only after chlorine solution has accumulated in the 0.3m± of 150 mm pipe to the primary cell. The undiluted chlorine solution would promote rapid corrosion of the steel pipe.

Chlorine gas, from 70 kg cylinders, is used for disinfection. Monthly average dosages range from 1.9 to 3.0 mg/L. Because of the low chlorine usage (5-10 kg/month), daily chlorine consumption cannot be reliably measured.

The chlorinator metering tube is sufficiently small that chlorine dosage rates can be altered to maintain a chlorine residual of approximately 0.8 mg/L in the treated water leaving the plant.

D:4 Operation of Specific Components

D:4:a Intake

The intake structure lies in shallow water in an excavated pocket at the edge of a channel dredged into the lake. The entire intake structure is below the surrounding lake bottom. A buoy is attached to the intake in the summer months when there is a potential for damage to the structure by boaters.

There is a flushing connection for the intake pipe located just outside the Water Treatment Plant Building. The flushing connection has never been used.

D:4:b Screening

There are two manually cleaned screens in series in the low lift wet well. The upstream screen must be removed, hosed clean, and replaced.

The screens are too heavy to permit frequent cleaning. Frequent cleaning has not been required.

D:4:c Low Lift

The two 12.6 L/s low lift pumps are throttled at the common raw water pipe to operate at about 6 L/s. The flow rate is determined by timing the filling of the flocculation tank.

The two low lift pumps alternate on each plant start-up.

D:4:d Flash Mixing and Flocculation

Alum is currently injected into the raw water upstream of the static mixer. Alum addition is through a tapped blind flange on the side outlet arm of a 100 mm tee. This results in extremely slow dispersion of alum into the raw water stream. A nozzle is provided for polymer addition at the

same point as alum addition. When polymer was added at this point (up to about September 1987), alum and polymer could mix prior to addition to the raw water. Polymer addition is now at the inlet to the flocculation tank.

The static mixer used for flash mixing was fabricated by plant staff and is of indeterminate energy input.

It is reported that the mixer element must be removed periodically to clean accumulated slimes.

- Flocculation

The flocculation tank is an unbaffled single compartment tank with top inlet and bottom outlet.

The flocculator is a four-blade wooden paddle currently operating at 3 rpm ($G = 4\ S^{-1}$) and Gt of 7000.

The flocculator drive has been modified by addition of pulleys to permit lower flocculator speeds.

Chemical dosages are based on historical data and operator experience with similar conditions. While the plant is running at chemical dosages selected by the operator, jar tests are done to confirm the dosages. Jar tests are done once per week except when raw water quality changes. Then, jar tests are done daily.

Flocculation is ineffective. The tank contents were slightly milky with few observable floc particles.

D:4:e Sedimentation

The sedimentation tanks are fitted with 50 mm horizontal settler tubes. With only about 0.3m at the inlet and outlet ends of the settler tube packs, the tubes cannot be inspected in place.

The clarifier effluent contains light fragile alum floc carried through the settler tubes. The voluminous floc currently produced is susceptible to scour. Improved flocculation is required to improve settle performance.

The settled sludge is backflushed from the settler tubes during backwash of the filter. The sludge along with backwash water is discharged directly to a sanitary sewer.

D:4:f Filters

The shallow filter tanks (total tank depth of 1.83m, water depth = 1.62m) require a siphon discharge (negative filter discharge pressures) to provide filtering head.

The filters are proprietary mixed media filters, using anthracite, silica sand and garnet sand over a gravel support to produce a reverse graded filter bed, according to the manufacturer.

The filters are constant level filters. The water level above the filter is maintained constant by a level controller modulating a filter effluent valve. The filters operate at nearly constant rate (variation due to level control gap) because:

- the low lift pump discharge rate is fixed

- flows to the two units are split and when a filter is backwashed, the flow to that filter is overflowed to waste, not taken up by the filter in service.

The filters, when installed, had an effluent discharge pipe into the primary cell terminating above high water level. Even when the discharge piping was modified in accordance with Microfloc's instructions, the filter could not handle more than about 0.55 ML/d (total on both filters) without overflowing. The hydraulic capacity of the filters is decreasing, and is currently 0.35 ML/d (3.9 m/hr filter rate). Decreasing hydraulic capacity of the filters may be a result of the mudball formation and cementing of the media. Since the initiation of the study, the mixed media has been replaced by a dual media consisting of 1.1 mm anthracite over 0.4 mm silica sand. The plant is reportedly operating at the re-rated capacity of 0.55 ML/d.

The surface of the filters is cemented by a gelatinous deposit, resulting in media loss during backwash and higher headloss during operation.

The operators report mudballs as large as grapefruits.

Surface washwater distribution is not uniform and is insufficient to break-up the surface deposits. Recent increase in maintenance of the surface washwater nozzles have improved surface wash operation.

Distribution of backwash water is uneven.

Backwash can be initiated manually by the operator or automatically on head loss. The backwash sequence is programmed and covers less than ten minutes. The steps are:

Time	
0 min.	Effluent valve closes
0 min.	Waste valve opens, draining sedimentation tank contents
0.8 min.	Surface wash valve opens
2.5 min.	Backwash pump starts
3.0 min.	Backwash valve opens
5.0 min.	Waste valve closes
6.3 min.	Surface wash valve closes
8.2 min.	Backwash valve closes
8.2 min.	Backwash pump stops
8.5 min.	Effluent valve opens

The top of the filter media at rest is about 50 mm below the surface wash pipe.

The backwash water, along with settler sludge and flocculation water to the settler-filtration train being backwashed, is discharged to a sanitary sewer.

As required, anthracite matching original anthracite specification, i.e., E.S. of 1.1 mm, is added as required to maintain total media depth.

D:4:g Clearwell (Treated Water Reservoir)

Chlorine solution is added to the filter effluent for disinfection.

Chlorine dosage is manually set to dose sufficient chlorine to maintain about 0.8 mg/L total residual in the treated water pumped to the distribution system. Dosage rate is based on experience.

Chlorination is on-off with the treatment plant. Chlorine feed is stopped by interrupting chlorine ejector water by a solenoid valve controlled by the Package Plant Control Panel.

D:4:h Chemicals

- Alum and Polymer

Dosages are set based on experience and once per week confirmed by jar tests. If the water quality changes, jar tests are conducted to determine new requirements daily, as required. The wide variation in dosages is due, in part, to the wide range of raw water turbidity. Also, in 1986 metering pumps were calibrated to reflect actual alum dosages. Previous to 1986, operators set metering pumps based on experience and alum dosages were at best only an estimate, based on curves provided by pump manufacturer.

Daily alum dosages recorded are calculated from calibrated metering pump settings. Drawdown of the large diameter storage tank cannot be measured daily or even monthly.

Recorded polymer dosages are based on calibrated metering pump setting.

Alum and polymer dosages are set manually. The metering pumps start and stop with the low lift pump and treatment plant.

There is no dilution of chemicals prior to injection into the raw water. Alum concentration is 48.5 per cent $Al_2(SO_4)_3.14H_2O$ (as delivered). Polymer is made up to 2000 mg/L.

- Powdered Activated Carbon

Powdered activated carbon is fed at 5 mg/L for taste and odour control. The amount of carbon used is monitored daily.

Variations in PAC dosages result from variations in bulk density of PAC in the storage hopper feeding the volumetric feeder.

D:5 Sampling and Data Collection

Raw water and filtered water turbidimeters are installed, but have never been used.

The "As-Constructed" Drawings indicate a chlorine residual analyzer to be supplied and installed by "Owner", i.e., MOE. There is no evidence of a residual analyzer.

All monitoring data have been collected manually. Plant monitoring is as follows:

Test	Sample Point	Testing Frequency	Testing Instrument
Turbidity	Raw Water	Once per day	Hach 2100A
	Filtered Water	"	
	Treated Water	"	
Combined Chlorine Residual	Treated Water	Once per day	DPD, Hach Comparator
Temperature	Raw Water	Once per day	Thermometer
	Treated Water	"	

The raw water temperatures in winter are inconsistent with experience, particularly for the shallow intake depth. The lowest recorded raw water temperature was 3°C. The average temperature over the four-year period for the months of January and February is 6.3°C.

D:6 Daily Operator Duties

Plant Records and Logs

Each day several logs are kept by the plant staff to monitor all aspects of the plant operation. As well, at the end of each month, a summary of plant flows, chemical doses, water quality and a record of "Utilities and Materials Consumption" are produced. Examples of Utilities Monitoring Reports can be found in Appendix IV.

E. PLANT PERFORMANCE

E:1 Turbidity

Raw water, filtered water and treated water are monitored once daily for turbidity. There are no turbidity measurements of settled water.

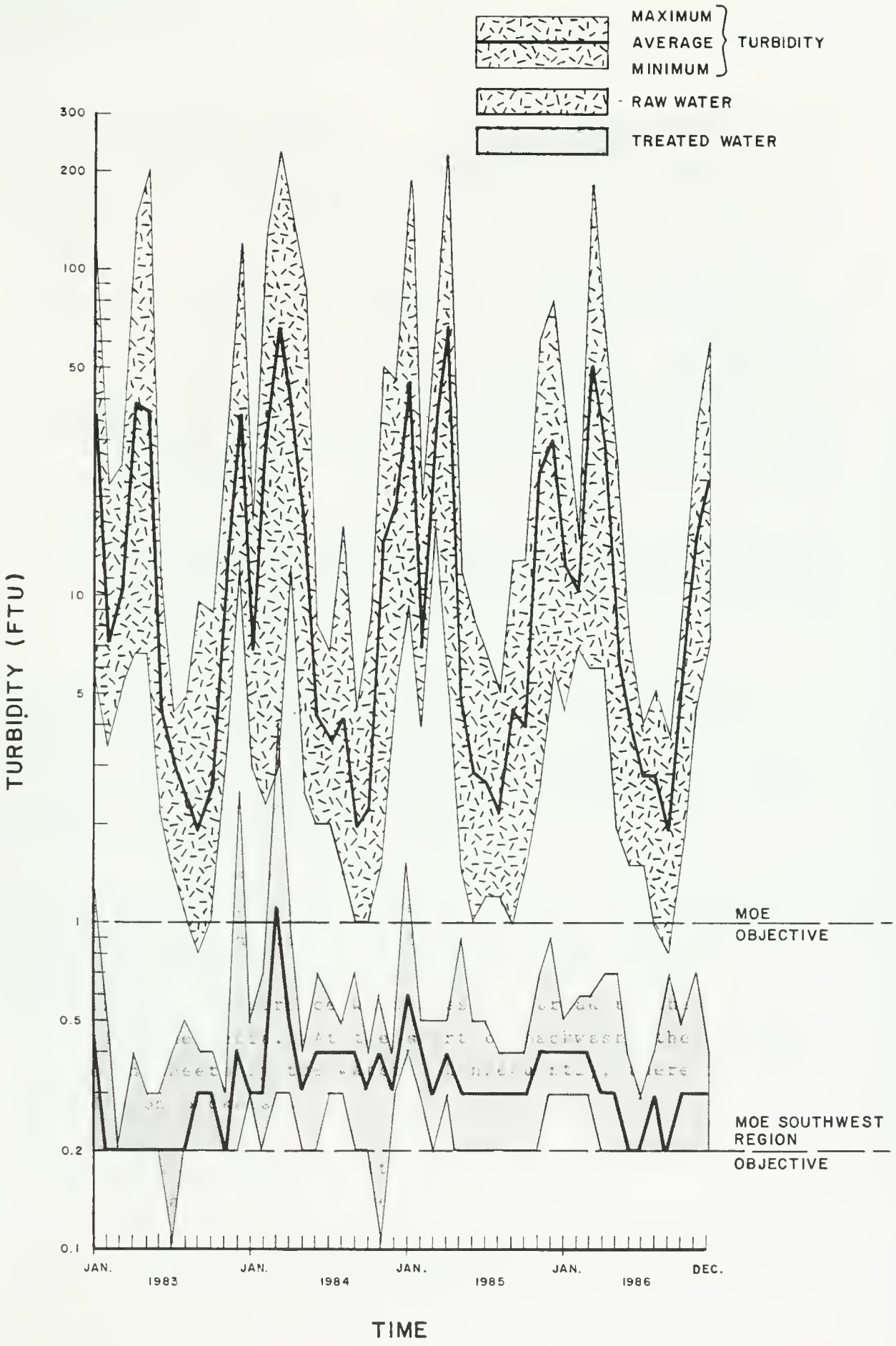
Treated water (i.e., water to the distribution system) turbidities are generally greater than filter effluent turbidity, indicating post-precipitation of alum in the treated water reservoir and subsequent pick-up by the high lift pumps.

In 1986, treated water turbidity did not exceed 1.0 NTU. However, on 344 days treated water turbidity was greater than the MOE Southwestern Region Utility Operations objective of 0.2 NTU. This is shown on Figure 6.

Being a high rate treatment plant with short retention time in the sedimentation and filtration sections, ineffective flocculation impacts on poor turbidity removal. Coagulation and flocculation must be improved.

Coagulation, the destabilization of colloidal particles which are responsible for turbidity, is not an instantaneous reaction. In cold water, the alum coagulation reaction may require several minutes to complete. Rapid dispersion of alum is required to ensure the entire flow is contacted.

Polymer is added to aid flocculation by agglomerating the destabilized particles. Alum addition and reaction must precede polymer addition to prevent unwanted interaction of the two chemicals.



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Ontario Ministry of the Environment

MITCHELL'S BAY WPOS

RAW & TREATED WATER TURBIDITY

FIG. No. **6**

E:2 Disinfection

Treated water samples are taken for bacti analysis once per week. All analyses during 1986 showed absence of total coliforms, fecal coliforms and fecal streptococci.

Total chlorine residuals are measured. DWSP data shows a wide variance in combined chlorine residuals and in free chlorine residuals. Because chlorine dosages are manually set only once per day, based on the operator's experience, chlorine dosages do not necessarily reflect current chlorine demands, particularly when water quality changes quickly.

Total THM in the treated water averaged 69 ug/L, much lower than the Drinking Water Guideline maximum concentration of 350 ug/L.

F. PARTICULATE REMOVAL

Turbidity measurements done by the WTP are, on average, higher than those recorded for DWSP or by the MOE London Laboratory. The comparisons are on paired samples, taken the same day, but not necessarily duplicate samples. The differences in turbidity measurements between the WTP results and:

- DWSP are not statistically significant for raw water, but are significant at the 0.1 level for treated water. (That is, 10 per cent chance that the conclusion that the turbidity measurements are different is wrong.)

- MOE London Laboratory is not statistically significant for raw water, but is significant for treated water at the 0.1 level.

All treated water samples during the period 1983 to 1986, excepting two days in January 1983 and nine days in March 1984, had turbidities equal to or less than 1.0 NTU. The plant is not capable of meeting the MOE Southwestern Region Utility Operations turbidity goal of 0.2 NTU.

Jar tests were done by the WTP operator and observed by Dillon staff. These tests were in accordance with standard jar test procedures. No jar testing was conducted by Dillon.

Jar tests conducted at the WTP by plant staff produce large settleable floc with clear supernatant. The plant flocculator produces an opalescent water with slow settling fragile floc. There is carry-over of the floc from the settlers to the filters.

Jar tests use dilute chemical solutions to aid dispersion. There is no back-mixing in a jar test. This condition can be

duplicated in a full-scale plant only by a plug flow flocculator. Until short-term modifications to the treatment plant have been made, jar testing to optimize coagulant dosages is inappropriate.

Alum is dosed directly from the storage tank as a 48.5 per cent solution. The quantity used is too small to be measured.

Better dispersion of polymer is required. The polymer injection point must be downstream of alum addition, and after colloid destabilization by alum has occurred.

The single compartment flocculation tank provides about 17 minutes' displacement time. The flocculator is run at its lowest speed producing a velocity gradient of about 4 S^{-1} and Gt of 7,000 at current flow rates. Hudson ("Water Clarification Processes") cites optimum values of G=54 S^{-1}, t = 33 minutes (Gt = 110,000) for a single compartment flocculator used for flocculation prior to sedimentation. The MOE "Guidelines for Design of Water Treatment Plants" states: "typical flocculation times are in the order of 30 minutes at design flow ... and typical Gt values of 50,000 to 125,000 are required."

It is likely that only part of the filter area is usable because of mudballs and cementing of media. Effective filter rates, based on an estimate of available filter area by observation of backwash water, is in the range of 12 to 20 m/hr (original design rate is 12 m/hr).

G. DISINFECTION

All bacteriological analyses are done by the MOE London Laboratory.

One sample of raw water and one sample of treated water leaving the plant, and one sample from the distribution system are taken once per week.

All treated water samples, during the four-year period of record, tested "Absent" for total coliform.

The water is disinfected by addition of chlorine solution to the filter effluent. Use of chlorine gas is too low to measure daily.

The treated water is sampled once per day for residual chlorine analysis. Total chlorine residual is measured using the DPD method with a colour comparator.

With PAC addition for taste and odour control removing trace organics, and with post-filtration chlorination only, formation of THM has been minimized.

H. PROCESS MODIFICATIONS

H:1 Intake

The intake is in shallow water at the edge of a dredged channel below the surrounding lake bottom. At de-rated plant capacity of 0.55 ML/d, velocity in the 400 mm intake pipe is only 0.05 m/s. Combined with long periods of plant shut-down, there is potential for settling in the intake pipe.

Short-term: The intake pipe should be inspected and back-flushed if it is found to be silted in. There is a flushing connection for the intake pipe located outside of the WTP building. Thus, the intake can be backflushed by connecting a portable pump at the flushing connection. A program of annual inspection and backflushing should be started.

Long-term: The intake structure should be inspected yearly and cleared of silt as required.

H:2 Chemical Addition

Alum

Alum is dosed directly from the storage tank. The quantity is too small with respect to the size of the storage tank and, therefore, cannot be measured.

Short-term: To aid in controlling alum dosage and dispersion, a 200L day tank should be installed with provisions for diluting the bulk alum solution with four volumes of water to produce a feed solution of 9.6 per cent. Thus, the solution used could be measured daily. At this time, replacement of liquid alum with bagged alum should be evaluated.

The alum should be injected directly into the raw water stream, rather than the side outlet of a tee. This injection nozzle should extend to 1/3 pipe diameter.

The alum should be further diluted just prior to injection into the raw water. Dilution water flow of 1 L/min± is required.

Chemical calibration equipment should be installed on the metering pumps.

Long-term: Other coagulants, such as PAC, HyperI+on and $FeCl_3$ should be investigated to replace alum.

The alum storage tank should be removed to provide space for installation of a second flocculation tank and sedimentation tank (see H:3 and H:4). Dry alum could be mixed into solution and dosed from the day tank.

Polymer

Better dispersion of polymer in the raw water is required.

Short-term: Install a polymer injection nozzle in the raw water pipe upstream of the manual raw water flow control butterfly valve.

Provide dilution water via a mixing tee just ahead of the polymer addition.

Long-term: Investigate and implement a proper method of preparing the polymer, such as a Polyblend system.

Chlorination

The existing chlorine injection point is downstream of a Y-bend for filter effluent directed to the secondary treated water cell. Thus, only primary effluent is chlorinated. If the treated water is directed to the secondary cell, it is chlorinated only after chlorine solution has accumulated in the portion of the pipe to the primary cell.

Short-term: The chlorination point in the filter effluent piping should be moved upstream of the Y-bend.

Location of a chlorination point at the top of the filter is recommended. This location allows for flows to both cells to be chlorinated and provides the added benefit of detering any undesirable biological growth in the filters.

Long-term: The amount of chlorine used is small. Sodium hypochlorite solution, while more expensive than chlorine gas, is safer to use and there is no danger to the public using the adjacent park. The higher price of sodium hypochlorite will be partly offset by the interest currently paid on chlorine cylinder deposit.

H:3 Flocculation

Neither the desired retention time nor the velocity gradient can be attained, assuming maximum allowable paddle peripheral speed is 0.6 m/s.

Short-term: The paddle speed of the flocculator should be increased.

Long-term: A second 7.95 m^3 flocculation tank should be considered in series with the existing tank.

It could be installed at the present location of the alum storage tank, once the tank is removed (see H:2).

H:4 Sedimentation

Long-term: Install new sedimentation tanks at present location of alum storage tank (see H:2).

H:5 Filtration

Short term: The mixed media should be replaced with dual media since filtration at Mitchell's Bay appears to be largely a surface phenomenon. As happens in most filters, most of the solids are removed in the top 5 cm± of the filter media. The fine garnet sand in the lower part of the filter bed contributes no measurable turbidity removal. Replacement with 1.1 mm anthracite over 0.4 mm silica sand is recommended. Sharp angular anthracite is reported to be more effective than rounded material.

During media replacement, the perforated pipe underdrains should be inspected, cleaned and replaced, if necessary.

The surface wash system should be inspected and the nozzles should be replaced.

Surface wash water is currently supplied by the backwash pump (at low pressure). Surface wash should be re-piped to take water from plant service water (high lift pump header).

The filter system was designed to operate on a siphon discharge to provide filtering head. However, a siphon discharge was never installed and, as a result, the filters cannot operate at the design filter rate of 12.2 m/hr (5 USgpm/ ft^2). Filter hydraulics should be reviewed to determine how they might be improved, such as by adding a siphon or a pump, to increase the filter rate to design levels.

The accumulation of mudballs indicates ineffective cleaning of filters. Filter backwash time should be increased.

An air release valve should be installed in the backwash pump discharge pipe to exhaust air in the pump column.

Long-term: Filter media should be sampled annually to determine media grain size. Media size may change due to washout of fines, attrition, accumulation of precipitates on the media, etc.

H:6 High Lift Pumps

Currently, both high lift pumps are installed in the primary cell of the treated water reservoir. As a result, the primary cell cannot be taken out of service for inspection or cleaning.

Short-term: A 15.2 L/s high lift pump should be installed in the secondary cell.

H:7 Instrumentation

Short-term: The raw and treated water turbidity meters should be overhauled and placed in service. The treated water turbidity unit should be installed on the high lift water header leaving the plant. Treated water turbidity should be recorded. A high level alarm should be incorporated on treated water turbidimeter.

A chlorine residual analyzer with recorder and high and low chlorine residual alarm should be installed.

H:8 Process Control

Process control is based largely on operator experience with changes in chemical dosing made only when there is a marked change in raw water quality, or when filtered water turbidity deteriorates.

Short-term: Evaluate a streaming current monitor or similar process for control of alum dosage.

In addition to the jar tester, turbidimeter and chlorine comparator currently available at the WTP laboratory, provide:

- spectrophotometer for residual aluminum, colour and residual chlorine (total and free)

- pH meter

- glassware, magnetic stirrer and reagents for alkalinity. End point indication by pH meter.

Prepare an Operating Manual.

H:9 Other Non-process Concerns

Short-term: The level switches in the treated water reservoir are Flygt ENH-10 which incorporate mercury switches. These should be replaced by level sensors suitable for use in potable water.

Long-term: There have been many modifications to the plant, including construction of a PAC room. The modifications are not reflected on "As-constructed" Drawings. It is recommended that all plant modifications be recorded on up-to-date Drawings.

Process Automation

Long-term: Increased storage has been provided by the secondary cell of the treated water reservoir. Existing control levels could be lowered further while maintaining the initial design water reserves, thus allowing a greater working volume.

K. Sakamoto, P. Eng.
Project Manager

Lianna Mah, P. Eng.
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Appendix A-1

Terms of Reference
Water Plant Optimization Study

Notes:

1. These Terms of Reference should be read in conjunction with The Optimization Protocol (06/04/87 (Rev.1)).

2. References to Appendices and Tables in the Terms of Reference relate those found in the Optimization Protocol.

APPENDIX I

TERMS OF REFERENCE

Purpose

To review the present conditions and determine an optimum treatment strategy for contaminant removal at the plant, with emphasis on particulate materials and disinfection processes.

Work Tasks

1. Receive an information package from the MOE. Review the information provided and meet with the MOE staff, if required, to discuss the project.

2. Document the quality and quantity of raw and treated waters.

3. Define the present treatment processes and operating procedures. Prepare a progress report on Works Tasks 1-3 for the Project Committee.

4. Assess the methods of efficient particulate removal which would utilize the present major capital works of the plant. Evaluate the particulate removal efficiency and sensitivity of operation, assuming optimum performance of the plant.

5. Assess current disinfection practices and possible improvement methods.

6. Describe possible short and long-term process modifications to obtain optimum disinfection and contaminant removal.

7. Prepare a draft report for the project committee's review.

8. Prepare the final report.

1. RECEIVE AN INFORMATION PACKAGE FROM THE MOE. REVIEW THE INFORMATION PROVIDED AND MEET WITH THE MOE STAFF, IF REQUIRED, TO DISCUSS THE PROJECT.

Elements of Work

(a) Receive an information package from the MOE concerning the plant and the study. This package includes a general terms of reference, a general table of contents for organizing the study in a manner consistent with other plant reports, the WPOS reporting tables and a copy of Ontario Drinking Water Objectives.

(b) Review the information and prepare for a meeting to initiate the work on the project, including preparation of a schedule of manpower and staff committments.

(c) Meet with the MOE to discuss the available data, the terms of reference, and the project staff and work schedule. If a consultant is carrying out more that one study it may not be necessary to meet with the MOE at the start of each study.

2. DOCUMENT THE QUALITY AND QUANTITY OF RAW AND TREATED WATERS.

Elements of Work

(a) Prepare a monthly summary of maximum, minimum, and average flows for the last three consecutive years (Table 1.0). Address any discrepancies which exist between raw and treated flow rates.

(b) Based on the above, briefly review and tabulate for the last three years, the monthly maximum, minimum, and average per capita flow for the total population served by the plant (Table 1.1). Compare the plant data with typical per capita flows for the local region. Indicate major consumers who may influence the figures.

(c) Document the methods of measuring the raw and treated water flow rates.

(d) Summarize, for the last three consecutive years, where available, the raw and treated water; turbidity, colour, residual aluminum/iron, pH, temperature and treatment chemical dosages (other than disinfection and fluoridation). The summary should indicate the monthly daily average and maximum and minimum day (Table 2.0).

For the same three year period, tabulate also the daily average for the typical seasonal months of January, April, July and October as well as other months in which problems with particulate removal occurred (Tables 2). Document enough data to define and evaluate those problems.

Record other data, such as particulate counting, suspended solids, and algae counting (Table 5.0) which could reflect on particulate removal efficiency.

Document the source and methods used in determining all information.

A comparison should be made between the plant and outside laboratory information to ascertain the relative validity of the data. For plant data, emphasis should be given to plant laboratory tests rather than continuous process control instruments.

(e) Summarize for the last three consecutive years, where available, the disinfectant demand, dosages (including all disinfection related chemicals and residuals) for all application points as well as fluoridation dosage and residual. The summary should indicate the monthly daily average and maximum and minimum day (Table 3.0).

For the same three year period, tabulate (Tables 3) the daily average for the typical seasonal months of January, April, July and October as well as other months in which problems with chlorine residuals and/or positive bacterial tests identified in Table 6. Document enough data to define and evaluate those problems.

Document the methods of dosage evaluation and residual measurements, and establish the validity of the data provided.

(f) Prepare a summary, based on at least three years of data, of the raw and treated water quality testing data for physical, microbiological, radiological, and chemical water quality information (Table 4). Document as much data as is needed to show possible seasonal trends in water quality. Where possible, show corresponding sets of raw and treated water quality information.

Document the source and methods used in determining all water quality information and establish the validity of the data, comparing plant and outside laboratory data.

(g) Tabulate, for the last three consecutive years, the raw and treated water bacterial test information at the plant (Table 6).

Document the source and methods used for all data provided.

(h) Document the water sampling systems (source, pump, line-material and size, vertical rise velocity sampling location) used in the plant (similar to DWSP Questionnaire in Appendix A).

(i) Prepare a summary of inplant testing including Test, Sampling Point, Testing Frequency, Reporting Frequency, Testing Instrumentation including calibration.

(j) Identify other water quality concerns, not related to particulate removal or disinfection, which should be considered as part of the assessment phase of this evaluation program.

3. DEFINE THE PRESENT TREATMENT PROCESSES AND OPERATING PROCEDURES. PREPARE A PROGRESS REPORT ON WORK TASKS 1-3 (8 COPIES), FOR THE PROJECT COMMITTEE.

Elements of Work

(a) Where drawings are available, assemble sufficient record drawings of a reduced size, to document the general site layout and the interrelationship of major plant components. If available, include a process and piping diagram (PAPD) of the plant operations.

(b) Prepare a simplified block schematic of all major plant components including chemical systems and indicating design parameters. Appendix B is an example of the required standard schematic.

(c) Prepare a photographic record of the plant facilities, illustrating all of the major plant components and chemical feed systems. The record should include approximately 30-40 coloured (9 cm x 12 cm) (or 10 cm x 15 cm) prints, suitably labelled. The progress and draft reports may include photocopies in lieu of the prints.

(c) Tabulate the design parameters for all the major plant components, with emphasis on the process operations, including chemical feeds. This information, as a minimum, must be consistent with the OWSP Questionnaire (Appendix A) and must be confirmed and verified by field observations. The design parameters should be evaluated at design, rated and actual operational flows.

(e) Prepare a summary of how the plant is operated, including chemical dosage control, such as jar testing information, filter backwashing procedures and initiation, and pumping and flow control.

(f) Document all reported and other apparent problems in plant operations and/or in the distribution system related to water quality. In addition list the health related parameters which exceed the Ontario Drinking Water Objectives (Table 7).

(g) Submit 8 copies of the progress report to the Prime Consultant for distribution to the Project Committee.

4. ASSESS THE METHODS OF EFFICIENT PARTICULATE REMOVAL WHICH WOULD UTILIZE THE PRESENT MAJOR CAPITAL WORKS OF THE PLANT. EVALUATE THE PARTICULATE REMOVAL EFFICIENCY AND SENSITIVITY OF OPERATION, ASSUMING OPTIMUM PERFORMANCE OF THE PLANT.

Elements of Work

(a) Assess the validity and implication of all information relating to particulate removal provided in Work Tasks 1 and 2 with emphasis on method, metering and sampling, etc.

(b) Using information provided in Work Tasks 1, 2 and 3 evaluate the plant's particulate removal efficiency. The basis of minimum particulate removal should be 1.0 F.t.u. It should, however, be recognized that it is desirable to strive for an operational level which is as low as is achievable.

(c) Conduct an evaluation of possible optimum performance alternatives. Include jar testing using established industry practice.

(d) Evaluate the feasibility of optimum removal using the existing plant capital works. This evaluation should consider the worst case water quality conditions, even though field testing data may not be available during the initial phase of the study (see Work Task 7).

(e) Describe the operational procedures, management strategies, and equipment required for various feasible alternatives. Estimate chemical dosages, level of operational expertise, and sensitivity of operation of the alternatives.

5. ASSESS CURRENT DISINFECTION PRACTICES AND POSSIBLE IMPROVEMENT METHODS.

Elements of Work

(a) Assess the validity and implication of all information relating to disinfection provided in Work Tasks 1, 2 and 3 with emphasis on method, metering and sampling etc.

(b) Using the information provided in Work Tasks 1, 2 and 3 evaluate the plant's ability to disinfect the water. The basis of minimum disinfection should be to ensure a water quality as described in the Ontario Drinking Water Objectives.

(c) Conduct an evaluation of possible optimum disinfection procedures for the plant, with consideration also given to the reduction of chlorinated by-products in the treated water.

(d) Evaluate the feasibility of the various alternatives using the existing plant capital works.

(e) Assess the relative merits of the alternatives. Describe the operational procedures, management strategies, and equipment required for the feasible alternatives. Estimate chemical dosages, level of operational expertise, and sensitivity of operation for the alternatives.

6. DESCRIBE POSSIBLE SHORT AND LONG-TERM PROCESS MODIFICATIONS TO OBTAIN OPTIMUM DISINFECTION AND CONTAMINANT REMOVAL.

Elements of Work

(a) Prepare a list of modifications which should be considered for detailed implementation evaluation. Provide an estimated cost and possible schedule for implementation for each of the proposed modifications.

It is not the purpose of this study to provide a detailed implementation scheme for plant rehabilitation. It is, however, necessary to scope the feasible short and long-term process modifications required to achieve optimum disinfection and contaminant removals.

(b) Incorporate (a) above in the draft report.

7. PREPARE A DRAFT REPORT FOR THE PROJECT COMMITTEE'S REVIEW. (8 COPIES).

Elements of Work

(a) The report must include all information for Work Tasks 1-6.

The information must be organized and presented in a logical and co-ordinated fashion. A general table of contents (Appendix C) is provided for organizing the material in a manner consistent with other plant reports.

Submit the draft report for review by the Project Committee.

(b) Meet with the Project Committee on site at least one week after submission of the report.

(c) Prepare a separate letter report containing recommendation(s) concerning the need for additional field testing to cover quality conditions not available during the period of this study. The Project Committee may decide to delay completion of the final report until field data can be obtained to confirm the predictions of performance for the worst case water conditions.

APPENDIX II

TABLES

TABLE 1.0: FLOWS (ML/d)

MONTH	R/T	1986			1985			1984			1983		
		MAX.	MIN.	AVG.	MAX.	MIN.	AVG.	MAX.	MIN.	AVG.	MAX.	MIN.	AVG.
JAN	R	0.087	0.050	0.063	0.105	0.036	0.057	0.099	0.042	0.055	0.070	0.031	0.043
	T	0.087	0.047	0.060	0.098	0.036	0.053	0.099	0.042	0.053	0.050	0.031	0.039
FEB	R	0.130	0.039	0.064	0.066	0.041	0.049	0.091	0.041	0.055	0.067	0.034	0.042
	T	0.116	0.039	0.060	0.066	0.040	0.047	0.091	0.041	0.053	0.053	0.031	0.040
MAR	R	0.089	0.040	0.060	0.066	0.039	0.051	0.073	0.032	0.051	0.074	0.032	0.042
	T	0.075	0.040	0.056	0.066	0.039	0.048	0.064	0.032	0.047	0.074	0.032	0.041
APR	R	0.124	0.041	0.064	0.080	0.042	0.057	0.088	0.044	0.062	0.067	0.036	0.046
	T	0.124	0.041	0.061	0.075	0.042	0.053	0.081	0.041	0.059	0.048	0.033	0.045
MAY	R	0.251	0.055	0.107	0.190	0.055	0.100	0.151	0.048	0.088	0.160	0.050	0.071
	T	0.237	0.055	0.104	0.176	0.053	0.097	0.137	0.045	0.085	0.146	0.049	0.070
JUN	R	0.165	0.071	0.113	0.205	0.077	0.120	0.196	0.077	0.128	0.181	0.050	0.114
	T	0.155	0.071	0.109	0.198	0.077	0.116	0.196	0.075	0.125	0.198	0.050	0.111
JUL	R	0.182	0.110	0.145	0.221	0.116	0.156	0.242	0.111	0.163	0.201	0.115	0.147
	T	0.215	0.110	0.141	0.221	0.109	0.150	0.235	0.111	0.157	0.194	0.108	0.144
AUG	R	0.186	0.104	0.143	0.195	0.098	0.140	0.189	0.085	0.136	0.193	0.079	0.126
	T	0.186	0.096	0.137	0.227	0.096	0.135	0.182	0.085	0.132	0.193	0.079	0.112
SEP	R	0.139	0.083	0.109	0.148	0.073	0.109	0.154	0.053	0.082	0.151	0.063	0.095
	T	0.169	0.079	0.104	0.155	0.073	0.104	0.147	0.053	0.079	0.151	0.057	0.092
OCT	R	0.122	0.054	0.086	0.185	0.054	0.096	0.121	0.050	0.066	0.101	0.041	0.059
	T	0.110	0.053	0.081	0.185	0.054	0.093	0.114	0.048	0.064	0.101	0.041	0.057
NOV	R	0.084	0.050	0.065	0.085	0.051	0.065	0.062	0.040	0.051	0.080	0.038	0.049
	T	0.083	0.050	0.061	0.076	0.051	0.062	0.058	0.040	0.049	0.080	0.038	0.048
DEC	R	0.082	0.044	0.061	0.089	0.044	0.063	0.067	0.037	0.050	0.105	0.041	0.062
	T	0.068	0.044	0.056	0.107	0.044	0.058	0.063	0.036	0.048	0.105	0.039	0.058

R = Raw; T = Treated

NOTE: Raw water flow is an estimate based on:
Raw water flow = measured treated water flow + estimated backwash water

SOURCE: WTP Utility Monitoring Records, Sheet B1

MITCHELL'S BAY

TABLE 1.1: PER CAPITA CONSUMPTION
(L/D/Capita)

CONSUMPTION	1986	1985	1984	1983
Population (1)	S 280 W 200	S 295 W 195	S 275 W 190	S 275 W 190
Maximum Day (2)	846	769	855	720
Minimum Day (3)	195	559	584	568
Average Day (4)	391	682	741	679
Ratio MD:AD (5)	2.17	1.13	1.15	1.06

(1) Estimated population served. S = Summer, W = Winter
(2) Based on summer population.
(3) Based on winter population.
(4) Based on weighted average population with summer populations for 3 months and winter populations for remainder.
(5) Ratio of maximum day to average day treated water flows from Table 1.0.

SOURCE: Population - Clerk, Dover Township
Flows - WTP Utility Monitoring Records, Sheet B1

MITCHELL'S BAY

TABLE 2.0: PARTICULATE REMOVAL SUMMARY

MONTH	PARAMETER		1986			1985			1984			1983		
			MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG
JAN	Turbidity (FTU)	R	38.0	4.5	12.4	185.0	9.0	45.1	17.0	3.0	6.9	126.0	5.4	36.3
		T	0.5	0.3	0.4	1.5	0.4	0.6	0.5	0.3	0.3	1.3	0.2	0.5
	Colour (TCU)	R												
		T												
	Prime Coagulant (mg/L)		120.0	50.0	59.0	48.0	6.0	15.3	6.0	3.0	5.2	36.0	3.0	14.6
	Coagulant Aid (mg/L)		0.8	0.6	0.6	1.0	0.3	0.4	0.4	0.3	0.3	1.0	0.4	0.6
	PAC (mg/L)													
	Metal Res. Al (mg/L)	R												
		T												
	pH	R	7.5	7.5	7.5									
		T												
	Temperature (DEG.C)	R	7.0	6.0	6.1	8.0	5.0	5.9	8.0	6.0	6.7	8.0	4.0	6.6
FEB	Turbidity (FTU)	R	15.0	7.0	10.4	20.0	4.0	6.9	125.0	2.3	29.2	22.0	3.2	7.1
		T	0.6	0.3	0.4	0.5	0.3	0.4	0.7	0.2	0.3	0.5	0.2	0.2
	Colour (TCU)	R												
		T												
	Prime Coagulant (mg/L)		114.0	68.0	95.5	6.0	5.0	5.6	42.0	3.0	11.9	6.0	3.0	3.4
	Coagulant Aid (mg/L)		0.8	0.4	0.6	0.4	0.3	0.3	0.9	0.4	0.4	0.3	0.2	0.3
	PAC (mg/L)													
	Metal Res. Al (mg/L)	R												
		T												
	pH	R	7.5	7.5	7.5				7.5	7.5	7.5			
		T							7.4	7.4	7.4			
	Temperature (DEG.C)	R	7.0	5.0	5.5	7.0	6.0	6.6	6.0	5.0	5.9	7.0	6.0	6.9

NOTE: Prime coagulant and coagulant aid dosages are calculated from metering pump setting.
Metering Pump calibrated for prime coagulant dosage in 1986. Validity of previously reported prime coagulant dosages is questionable.

SOURCE: WTP Utility Monitoring Records, Sheet B4-C4

TABLE 2.0: (cont'd)

MONTH	PARAMETER		1986 MAX	1986 MIN	1986 AVG	1985 MAX	1985 MIN	1985 AVG	1984 MAX	1984 MIN	1984 AVG	1983 MAX	1983 MIN	1983 AVG
MAR	Turbidity (FTU)	R	175.0	6.0	51.5	70.0	17.0	35.9	230.0	3.0	67.3	25.0	5.4	10.5
		T	0.6	0.3	0.4	0.5	0.2	0.3	4.1	0.3	1.1	0.2	0.2	0.2
	Colour (TCU)	R												
		T												
	Prime Coagulant (mg/L)		270.0	50.0	90.0	18.0	6.0	11.6	48.0	4.0	18.6	6.0	3.0	3.7
	Coagulant Aid (mg/L)		1.4	0.5	0.9	0.5	0.3	0.4	1.0	0.3	0.5	0.3	0.3	0.3
	PAC (mg/L)													
	Metal Res. Al (mg/L)	R												
		T												
	pH	R												
		T												
	Temperature (DEG.C)	R	5.0	3.0	4.4	7.0	5.0	5.8	6.0	3.0	5.5	8.0	6.0	7.1
APR	Turbidity (FTU)	R	65.0	6.0	28.1	220.0	5.0	69.8	150.0	12.0	36.7	142.0	6.7	38.3
		T	0.7	0.2	0.3	0.5	0.3	0.4	1.0	0.3	0.5	0.4	0.2	0.2
	Colour (TCU)	R												
		T												
	Prime Coagulant (mg/L)		80.0	60.0	66.3	42.0	6.0	19.4	30.0	6.0	13.2	45.0	3.0	13.4
	Coagulant Aid (mg/L)		1.0	1.0	1.0	1.0	0.3	0.5	0.8	0.3	0.3	1.0	0.3	0.4
	PAC (mg/L)													
	Metal Res. Al (mg/L)	R												
		T												
	pH	R	7.8	7.8	7.8									
		T	7.4	7.4	7.4									
	Temperature (DEG.C)	R	10.0	4.0	7.6	12.0	6.0	8.8	10.0	5.0	7.5	9.0	7.0	7.8

NOTE: Prime coagulant and coagulant aid dosages are calculated from metering pump setting.
Metering Pump calibrated for prime coagulant dosage in 1986. Validity of previously reported prime coagulant dosages is questionable.

SOURCE: WTP Utility Monitoring Records, Sheet B4-C4

MONTH	PARAMETER		1986 MAX	1986 MIN	1986 AVG	1985 MAX	1985 MIN	1985 AVG	1984 MAX	1984 MIN	1984 AVG	1983 MAX	1983 MIN	1983 AVG
MAY	Turbidity (FTU)	R	24.0	2.0	6.7	12.0	1.5	5.0	85.0	2.5	15.9	200.0	6.6	36.9
		T	0.7	0.2	0.3	0.9	0.2	0.3	0.4	0.2	0.3	0.3	0.2	0.2
	Colour (TCU)	R												
		T												
	Prime Coagulant (mg/L)		60.0	60.0	60.0	6.0	4.0	5.7	18.0	6.0	7.2	48.0	3.0	11.9
	Coagulant Aid (mg/L)		1.0	0.8	0.9	0.3	0.3	0.3	0.5	0.3	0.3	1.0	0.3	0.4
	PAC (mg/L)													
	Metal Res. Al (mg/L)	R												
		T												
	pH	R	8.1	7.9	8.0									
		T	7.7	7.7	7.7									
	Temperature (DEG.C)	R	16.0	10.0	12.8	18.0	11.0	14.6	17.0	10.0	12.6	14.0	9.0	11.4
JUN	Turbidity (FTU)	R	7.2	1.5	4.0	8.6	1.0	2.9	8.2	2.0	4.4	12.0	2.2	4.7
		T	0.4	0.2	0.2	0.5	0.2	0.3	0.7	0.2	0.4	0.3	0.2	0.2
	Colour (TCU)	R												
		T												
	Prime Coagulant (mg/L)		60.0	60.0	60.0	4.0	4.0	4.0	6.0	0.3	2.6	6.0	3.0	5.4
	Coagulant Aid (mg/L)		0.8	0.6	0.7	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	PAC (mg/L)													
	Metal Res. Al (mg/L)	R												
		T												
	pH	R	8.2	8.0	8.1				8.2	8.2	8.2			
		T							7.6	7.6	7.6			
	Temperature (DEG.C)	R	20.0	16.0	18.2	20.0	16.0	17.8	21.0	13.0	19.3	24.0	13.0	18.1

NOTE: Prime coagulant and coagulant aid dosages are calculated from metering pump setting.
Metering Pump calibrated for prime coagulant dosage in 1986. Validity of previously reported prime coagulant dosages is questionable.

SOURCE: WTP Utility Monitoring Records, Sheet B4-C4

MONTH	PARAMETER		1986			1985			1984			1983		
			MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG
JUL	Turbidity (FTU)	R	4.2	1.5	2.8	6.7	1.2	2.7	6.5	2.0	3.6	4.4	1.5	3.1
		T	0.3	0.2	0.2	0.5	0.2	0.3	0.6	0.3	0.4	0.4	0.1	0.2
	Colour (TCU)	R												
		T												
	Prime Coagulant (mg/L)		60.0	60.0	60.0	3.0	3.0	3.0	4.0	3.0	3.1	6.0	3.0	4.7
	Coagulant Aid (mg/L)		0.8	0.6	0.7	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	PAC (mg/L)													
	Metal Res. Al (mg/L)	R												
		T												
	pH	R	8.4	8.2	8.3				8.3	8.3	8.3			
		T	7.9	7.9	7.9				7.4	7.4	7.4			
	Temperature (DEG.C)	R	25.0	19.0	21.9	24.0	20.0	22.4	24.0	20.0	21.9	27.0	2.0	23.2
AUG	Turbidity (FTU)	R	5.0	1.0	2.8	5.1	1.2	2.2	16.0	1.5	4.3	4.9	1.0	2.4
		T	0.4	0.2	0.3	0.4	0.2	0.3	0.5	0.3	0.4	0.5	0.2	0.2
	Colour (TCU)	R												
		T												
	Prime Coagulant (mg/L)		60.0	60.0	60.0	3.0	3.0	3.0	6.0	3.0	3.3	6.0	6.0	6.0
	Coagulant Aid (mg/L)		0.7	0.6	0.7	0.5	0.5	0.5	0.3	0.3	0.3	0.3	0.3	0.3
	PAC (mg/L)													
	Metal Res. Al (mg/L)	R												
		T												
	pH	R	8.6	8.2	8.4									
		T				7.3	7.3	7.3						
	Temperature (DEG.C)	R	23.0	19.0	21.9	23.0	21.0	22.2	25.0	22.0	23.4	27.0	22.0	24.2

NOTE: Prime coagulant and coagulant aid dosages are calculated from metering pump setting.
Metering Pump calibrated for prime coagulant dosage in 1986. Validity of previously reported prime coagulant dosages is questionable.

SOURCE: WTP Utility Monitoring Records, Sheet B4-C4

TABLE 2.0: (cont'd)

MONTH	PARAMETER		1986 MAX	1986 MIN	1986 AVG	1985 MAX	1985 MIN	1985 AVG	1984 MAX	1984 MIN	1984 AVG	1983 MAX	1983 MIN	1983 AVG
SEP	Turbidity (FTU)	R	3.7	0.8	1.9	13.0	1.0	4.5	4.5	1.0	1.9	9.4	0.8	1.9
		T	0.7	0.2	0.2	0.4	0.2	0.3	0.7	0.2	0.4	0.4	0.2	0.3
	Colour (TCU)	R												
		T												
	Prime Coagulant (mg/L)		60.0	60.0	60.0	6.0	3.0	4.4	3.0	3.0	3.0	6.0	6.0	6.0
	Coagulant Aid (mg/L)		0.7	0.7	0.7	0.6	0.5	0.5	0.3	0.3	0.3	0.3	0.3	0.3
	PAC (mg/L)													
	Metal Res. Al (mg/L)	R												
		T												
	pH	R	8.7	8.7	8.7	8.5	8.5	8.5						
		T				7.6	7.6	7.6						
	Temperature (DEG.C)	R	21.0	17.0	19.1	24.0	18.0	20.3	22.0	17.0	19.6	25.0	17.0	20.9
OCT	Turbidity (FTU)	R	9.0	1.8	6.1	13.0	1.5	4.0	9.0	1.0	2.2	8.9	1.0	2.6
		T	0.5	0.2	0.3	0.4	0.2	0.3	0.4	0.2	0.3	0.4	0.2	0.3
	Colour (TCU)	R												
		T												
	Prime Coagulant (mg/L)		60.0	60.0	60.0	6.0	3.0	3.5	3.0	3.0	3.0	6.0	3.0	5.8
	Coagulant Aid (mg/L)		1.0	0.7	0.8	0.5	0.5	0.5	0.3	0.3	0.3	0.3	0.3	0.3
	PAC (mg/L)													
	Metal Res. Al (mg/L)	R												
		T												
	pH	R	7.8	7.8	7.8	8.4	8.4	8.4						
		T				7.2	7.2	7.2						
	Temperature (DEG.C)	R	21.0	14.0	15.8	19.0	14.0	15.4	17.0	16.0	16.4	20.0	14.0	16.6

NOTE: Prime coagulant and coagulant aid dosages are calculated from metering pump setting.
Metering Pump calibrated for prime coagulant dosage in 1986. Validity of previously reported prime coagulant dosages is questionable.

SOURCE: WTP Utility Monitoring Records, Sheet B4-C4

TABLE 2.0: (cont'd)

MONTH	PARAMETER		1986			1985			1984			1983		
			MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG
NOV	Turbidity (FTU)	R	32.0	4.5	14.5	60.0	2.5	23.9	50.0	1.5	14.1	25.0	3.5	11.4
		T	0.7	0.2	0.3	0.7	0.2	0.4	0.6	0.1	0.4	0.3	0.2	0.2
	Colour (TCU)	R												
		T												
	Prime Coagulant (mg/L)		60.0	60.0	60.0	18.0	3.0	8.1	18.0	3.0	6.1	9.0	6.0	6.5
	Coagulant Aid (mg/L)		1.0	0.7	0.8	0.8	0.5	0.6	0.5	0.3	0.3	0.3	0.3	0.3
	PAC (mg/L)													
	Metal Res. Al (mg/L)	R												
		T												
	pH	R				8.2	8.2	8.2						
		T				7.3	7.3	7.3						
	Temperature (DEG.C)	R	14.0	7.0	10.2	15.0	8.0	11.9	16.0	9.0	11.9	14.0	9.0	12.1
DEC	Turbidity (FTU)	R	60.0	7.0	22.9	80.0	6.0	29.5	46.0	5.0	19.8	120.0	13.0	35.5
		T	0.4	0.2	0.3	0.9	0.3	0.4	0.4	0.3	0.3	2.5	0.2	0.4
	Colour (TCU)	R												
		T												
	Prime Coagulant (mg/L)		70.0	60.0	61.9	30.0	6.0	12.2	12.0	6.0	7.8	30.0	6.0	15.5
	Coagulant Aid (mg/L)		1.0	0.8	0.9	1.0	0.5	0.7	0.4	0.3	0.3	0.7	0.3	0.4
	PAC (mg/L)													
	Metal Res. Al (mg/L)	R												
		T												
	pH	R				8.1	8.1	8.1						
		T				7.5	7.5	7.5						
	Temperature (DEG.C)	R	8.0	5.0	5.9	11.0	5.0	6.9	10.0	7.0	7.9	9.0	5.0	7.2

NOTE: Prime coagulant and coagulant aid dosages are calculated from metering pump setting.
Metering Pump calibrated for prime coagulant dosage in 1986. Validity of previously reported prime coagulant dosages is questionable.

SOURCE: WTP Utility Monitoring Records, Sheet B4-C4

TABLE 2.1: PARTICULATE REMOVAL PROFILE (JANUARY, 1983)

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1							36.00	1.00						
2	54.00		0.80	0.80			36.00	1.00						7.00
3	126.00		0.60	0.60			36.00	1.00						6.00
4	85.00		0.78	0.88			24.00	0.50						4.00
5	54.00		0.75	1.30			24.00	0.50						5.00
6	49.00		0.45	1.20			24.00	0.50						5.00
7	20.00		0.37	0.95			36.00	0.50						6.00
8	100.00		0.40	0.95			36.00	1.00						6.00
9														
10	54.00		0.37	0.90			26.00	0.50						7.00
11	65.00		0.33	0.75			18.00	0.50						6.00
12	71.00		0.20	0.60	42.00	3.00	20.00	0.50						6.00
13	85.00		0.30	0.60			24.00	0.65						6.00
14	50.00		0.33	0.50			12.00	0.65						7.00
15	34.00		0.48	0.50			12.00	0.65						7.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
16	15.00		0.42	0.43			6.00	0.65						7.00
17	15.00		0.20	0.42			6.00	0.65						7.00
18	30.00		0.18	0.35			9.00	0.50						5.00
19	26.00		0.17	0.35			6.00	0.50						7.00
20	22.00		0.24	0.40			6.00	0.50						7.00
21	18.00		0.26	0.35			6.00	0.50						7.00
22	12.00		0.35	0.31			6.00	0.50						8.00
23	10.00		0.30	0.29			6.00	0.50						8.00
24	7.50		0.17	0.28			3.00	0.50						7.00
25	10.00		0.24	0.26			3.00	0.50						7.00
26	10.00		0.30	0.30			3.00	0.50						7.00
27	7.00		0.32	0.45			3.00	0.50						7.00
28	6.50		0.16	0.28			3.00	0.50						6.00
29	5.40		0.27	0.27			3.00	0.50						7.00
30	5.90		0.23	0.25			3.00	0.50						7.00
31	5.60		0.15	0.22			3.00	0.35						8.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

TABLE 2.1: PARTICULATE REMOVAL PROFILE (FEBRUARY, 1983)

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	4.80		0.17	0.20			3.00	0.30						7.00
2	3.60		0.13	0.25			3.00	0.30						7.00
3	3.50		0.13	0.22			3.00	0.25						7.00
4	3.50		0.10	0.17			3.00	0.25						7.00
5	3.20		0.20	0.24			3.00	0.25						7.00
6	3.50		0.25	0.32			3.00	0.25						7.00
7	3.60		0.15	0.17			3.00	0.25						7.00
8	6.00		0.13	0.17			3.00	0.25						6.00
9	14.00		0.14	0.26			3.00	0.25						7.00
10	17.00		0.15	0.20			6.00	0.25						7.00
11	22.00		0.15	0.20			6.00	0.25						7.00
12	18.00		0.45	0.20			6.00	0.25						6.00
13	12.00		0.28	0.22			6.00	0.25						7.00
14	8.00		0.24	0.17			3.00	0.25						7.00
15	8.00		0.17	0.24			3.00	0.25						7.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
16	7.50		0.20	0.22			3.00	0.25						7.00
17	6.50		0.18	0.25			3.00	0.25						7.00
18	6.20		0.15	0.20			3.00	0.25						7.00
19	5.00		0.20	0.26			3.00	0.25						7.00
20	4.90		0.19	0.22			3.00	0.25						7.00
21	5.00		0.10	0.15			3.00	0.20						7.00
22	4.50		0.13	0.20			3.00	0.20						7.00
23	3.70		0.20	0.47			3.00	0.25						7.00
24	3.50		0.20	0.27			3.00	0.25						7.00
25	3.20		0.13	0.22			3.00	0.25						7.00
26	3.20		0.26	0.25			3.00	0.25						7.00
27	7.40		0.27	0.27			3.00	0.25						7.00
28	8.70		0.10	0.18			3.00	0.25						7.00
29														
30														
31														

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	8.50		0.10	0.18			3.00	0.25						6.00
2	6.40		0.10	0.21			3.00	0.25						6.00
3	15.00		0.10	0.17			3.00	0.25						7.00
4	25.00		0.18	0.18			3.00	0.25						6.00
5	22.00		0.26	0.20			6.00	0.25						7.00
6	15.00		0.15	0.21			6.00	0.25						7.00
7	17.00		0.17	0.20			3.00	0.25						8.00
8	14.00		0.12	0.20			3.00	0.25						8.00
9	12.00		0.14	0.20	18.00		3.00	0.25						8.00
10	10.00		0.10	0.18		1.00	3.00	0.25						8.00
11	12.00		0.12	0.16			6.00	0.25						8.00
12	12.00		0.17	0.18			6.00	0.25						8.00
13	12.00		0.18	0.16			6.00	0.25						7.00
14	7.50		0.10	0.17			3.00	0.25						7.00
15	7.20		0.11	0.16			3.00	0.25						7.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
16	6.00		0.10	0.15			3.00	0.25						8.00
17	5.40		0.11	0.15			3.00	0.25						7.00
18	7.00		0.10	0.15			3.00	0.25						8.00
19	5.50		0.17	0.22			3.00	0.25						8.00
20	6.70		0.16	0.20			3.00	0.25						8.00
21	9.50		0.11	0.15			3.00	0.25						8.00
22	7.40		0.16	0.15			3.00	0.25						8.00
23	14.00		0.11	0.16			3.00	0.25						6.00
24	11.00		0.12	0.16			3.00	0.25						7.00
25	10.00		0.14	0.16			6.00	0.25						7.00
26	8.00		0.15	0.16			6.00	0.25						7.00
27	6.50		0.10	0.17			3.00	0.25						6.00
28	7.50		0.11	0.23			3.00	0.25						6.00
29	8.40		0.11	0.15			3.00	0.25						6.00
30	8.80		0.11	0.17			3.00	0.25						6.00
31	7.00			0.17			3.00	0.25						7.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	7.20		0.14	0.16			3.00	0.25						7.00
2	6.70		0.18	0.16			3.00	0.25						7.00
3	8.50		0.12	0.17			3.00	0.25						7.00
4	11.00		0.10	0.16			6.00	0.25						7.00
5	7.40		0.10	0.16			3.00	0.25						7.00
6	12.00		0.10	0.15	14.00	1.00	6.00	0.25						7.00
7	11.00		0.10	0.17			6.00	0.25						7.00
8	6.70		0.10	0.15			3.00	0.25						8.00
9	6.70		0.16	0.18			3.00	0.25						8.00
10	7.00		0.20	0.24			3.00	0.25						8.00
11	10.00		0.11	0.16			6.00	0.25						8.00
12	8.00		0.10	0.17			3.00	0.25						8.00
13	7.40		0.10	0.17			6.00	0.25						8.00
14	17.00		0.08	0.16			6.00	0.25						8.00
15	65.00		0.10	0.17			21.00	0.75						8.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
16	6.00		0.10	0.15			3.00	0.25						8.00
17	5.40		0.11	0.15			3.00	0.25						7.00
18	7.00		0.10	0.15			3.00	0.25						8.00
19	5.50		0.17	0.22			3.00	0.25						8.00
20	6.70		0.16	0.20			3.00	0.25						8.00
21	9.50		0.11	0.15			3.00	0.25						8.00
22	7.40		0.16	0.15			3.00	0.25						8.00
23	14.00		0.11	0.16			3.00	0.25						6.00
24	11.00		0.12	0.16			3.00	0.25						7.00
25	10.00		0.14	0.16			6.00	0.25						7.00
26	8.00		0.15	0.16			6.00	0.25						7.00
27	6.50		0.10	0.17			3.00	0.25						6.00
28	7.50		0.11	0.23			3.00	0.25						6.00
29	8.40		0.11	0.15			3.00	0.25						6.00
30	8.80		0.11	0.17			3.00	0.25						6.00
31	7.00			0.17			3.00	0.25						7.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
16	39.00		0.20	0.16			21.00	0.75						8.00
17	28.00		0.16	0.18			12.00	0.25						9.00
18	38.00		0.17	0.17			12.00	0.50						8.00
19	142.00		0.33	0.26			45.00	1.00						8.00
20	120.00		0.20	0.30			33.00	1.00						7.00
21	125.00		0.15	0.26			33.00	1.00						7.00
22	110.00		0.17	0.26			33.00	0.75						8.00
23	80.00		0.15	0.32			33.00	0.75						8.00
24	70.00		0.18	0.27			33.00	0.75						8.00
25	57.00		0.13	0.35			18.00	0.50						7.00
26	40.00		0.10	0.27			18.00	0.50						8.00
27	38.00		0.08	0.24			12.00	0.35						9.00
28	33.00		0.10	0.22			6.00	0.25						9.00
29	20.00		0.12	0.22			6.00	0.25						9.00
30	18.00		0.23	0.25			6.00	0.25						9.00
31														

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	6.60		0.19	0.20			6.00	0.25						9.00
2	8.30		0.10	0.20			6.00	0.25						10.00
3	18.00		0.10	0.18			6.00	0.25						10.00
4	15.00		0.10	0.22			6.00	0.25						10.00
5	27.00		0.12	0.22			6.00	0.25						10.00
6	127.00		0.20	0.18			36.00	0.75						10.00
7	200.00		0.12	0.20			48.00	1.00						11.00
8	110.00		0.12	0.22			36.00	0.75						10.00
9	120.00		0.13	0.25			36.00	0.75						11.00
10	100.00		0.10	0.22			36.00	0.75						10.00
11	60.00		0.13	0.23	31.00	4.00	18.00	0.35						10.00
12	44.00		0.13	0.23			15.00	0.35						11.00
13	35.00		0.13	0.24			9.00	0.30						11.00
14	22.00		0.11	0.20			9.00	0.30						12.00
15	18.00		0.12	0.19			9.00	0.25						12.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
16	23.00		0.13	0.21			6.00	0.25						12.00
17	15.00		0.13	0.18			6.00	0.25						11.00
18	9.00		0.12	0.16			3.00	0.25						11.00
19	7.50		0.13	0.20			3.00	0.25						11.00
20	8.00		0.14	0.17			3.00	0.25						11.00
21	22.00		0.16	0.23			6.00	0.25						11.00
22	25.00		0.17	0.20			6.00	0.25						11.00
23	8.90		0.16	0.24			6.00	0.25						12.00
24	25.00		0.17	0.20			6.00	0.25						13.00
25	15.00		0.19	0.20			6.00	0.25						13.00
26	17.00		0.13	0.17			6.00	0.25						13.00
27	12.00		0.15	0.19			6.00	0.25						13.00
28	9.50		0.20	0.20			6.00	0.25						13.00
29	13.00		0.28	0.23			6.00	0.25						13.00
30	14.00		0.15	0.19			6.00	0.25						14.00
31	8.00		0.15	0.18			6.00	0.25						13.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

TABLE 2.1: PARTICULATE REMOVAL PROFILE (JUNE, 1983)

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	12.00		0.18	0.19			6.00	0.25						13.00
2	8.00		0.19	0.22			6.00	0.25						13.00
3	6.00		0.18	0.18			3.00	0.25						14.00
4	5.10		0.19	0.18			3.00	0.25						14.00
5	5.30		0.21	0.22			3.00	0.25						15.00
6	5.50		0.21	0.21			6.00	0.25						15.00
7	5.00		0.15	0.20			6.00	0.25						15.00
8	5.50		0.12	0.23	23.00	1.00	6.00	0.25						14.00
9	5.00		0.20	0.23			6.00	0.25						14.00
10	4.70		0.20	0.23			6.00	0.25						15.00
11	3.90		0.25	0.22			6.00	0.25						15.00
12	9.60		0.25	0.24			6.00	0.25						15.00
13	3.00		0.16	0.22			6.00	0.25						17.00
14	3.20		0.11	0.27			6.00	0.25						17.00
15	2.80		0.13	0.25			6.00	0.25						17.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP.
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	(DEG.C)
16	3.50		0.15	0.25			6.00	0.25						18.00
17	3.50		0.15	0.20			6.00	0.25						24.00
18	3.70		0.37	0.34			6.00	0.25						21.00
19	4.50		0.17	0.23			6.00	0.25						21.00
20	5.50		0.14	0.20			6.00	0.25						20.00
21	5.00		0.13	0.17			6.00	0.25						20.00
22	4.50		0.10	0.16			6.00	0.25						20.00
23	3.20		0.12	0.21			6.00	0.25						20.00
24	2.20		0.15	0.18			6.00	0.25						22.00
25	3.20		0.13	0.17			6.00	0.25						22.00
26	3.20		0.15	0.17			6.00	0.25						22.00
27	2.20		0.14	0.20			4.00	0.25						22.00
28	4.50		0.11	0.21			4.00	0.25						24.00
29	2.20		0.08	0.21			4.00	0.25						23.00
30	5.00		0.16	0.19			4.00	0.25						22.00
31														

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	4.10		0.11	0.21			4.00	0.25						23.00
2	3.90		0.21	0.28			4.00	0.25						23.00
3	3.40		0.20	0.19			4.00	0.25						23.00
4	2.50		0.11	0.18			4.00	0.25						23.00
5	2.00		0.10	0.22			4.00	0.25						23.00
6	1.50		0.15	0.25	15.00	1.00	4.00	0.25						2.00
7	4.00		0.16	0.18			3.00	0.25						22.00
8	3.00		0.12	0.19			3.00	0.25						22.00
9	2.80		0.20	0.21			3.00	0.25						22.00
10	2.60		0.21	0.20			3.00	0.25						22.00
11	3.50		0.15	0.20			3.00	0.25						22.00
12	2.40		0.14	0.20			3.00	0.25						22.00
13	2.20		0.20	0.20			4.00	0.25						23.00
14	2.80		0.18	0.18			4.00	0.25						24.00
15	2.50		0.15	0.15			4.00	0.25						24.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
16	3.30		0.16	0.14			4.00	0.25						25.00
17	2.60		0.22	0.18			4.00	0.25						25.00
18	3.00		0.18	0.16			4.00	0.25						26.00
19	4.20		0.21	0.25			6.00	0.25						26.00
20	3.00		0.15	0.18			6.00	0.25						26.00
21	4.00		0.14	0.18			6.00	0.25						27.00
22	4.00		0.16	0.20			6.00	0.25						25.00
23	3.80		0.22	0.25			6.00	0.25						25.00
24	3.40		0.35	0.36			6.00	0.25						25.00
25	3.50		0.17	0.24			6.00	0.25						25.00
26	2.90		0.14	0.29			6.00	0.25						24.00
27	3.20		0.24	0.24			6.00	0.25						24.00
28	3.40		0.14	0.24			6.00	0.25						24.00
29	2.20		0.15	0.26			6.00	0.25						24.00
30	4.40		0.45	0.26			6.00	0.25						24.00
31	1.90		0.26	0.26			6.00	0.25						24.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	3.40		0.26	0.29			6.00	0.25						24.00
2	2.20		0.16	0.22			6.00	0.25						24.00
3	2.00		0.16	0.20			6.00	0.25						24.00
4	2.60		0.17	0.22			6.00	0.25						25.00
5	4.60		0.13	0.19			6.00	0.25						25.00
6	2.80		0.13	0.22			6.00	0.25						24.00
7	1.80		0.14	0.21			6.00	0.25						25.00
8	1.60		0.15	0.17			6.00	0.25						27.00
9	3.50		0.12	0.17			6.00	0.25						25.00
10	2.00		0.13	0.16	9.00	3.00	6.00	0.25						24.00
11	3.50		0.12	0.16			6.00	0.25						23.00
12	1.50		0.12	0.17			6.00	0.25						22.00
13	1.80		0.24	0.28			6.00	0.25						22.00
14	4.90		0.19	0.20			6.00	0.25						22.00
15	2.00		0.15	0.16			6.00	0.25						23.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
16	2.00		0.15	0.17			6.00	0.25						23.00
17	2.00		0.12	0.17			6.00	0.25						24.00
18	2.00		0.10	0.18			6.00	0.25						24.00
19	2.00		0.15	0.17			6.00	0.25						25.00
20	1.50		0.25	0.20			6.00	0.25						25.00
21	2.00		0.18	0.18			6.00	0.25						25.00
22	3.00		0.20	0.25			6.00	0.25						25.00
23	2.20		0.12	0.30			6.00	0.25						23.00
24	2.70		0.15	0.17			6.00	0.25						24.00
25	2.70		0.16	0.22			6.00	0.25						24.00
26	1.00		0.13	0.25			6.00	0.25						23.00
27	2.40		0.12	0.17			6.00	0.25						26.00
28	2.20		0.30	0.33			6.00	0.25						25.00
29	2.00		0.20	0.31			6.00	0.25						25.00
30	3.10		0.14	0.31			6.00	0.25						26.00
31	1.30		0.12	0.45			6.00	0.25						24.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	1.30		0.21	0.31			6.00	0.25						23.00
2	2.10		0.12	0.31			6.00	0.25						23.00
3	9.40		0.28	0.32			6.00	0.25						23.00
4	3.30		0.33	0.30			6.00	0.25						23.00
5	1.70		0.12	0.26			6.00	0.25						25.00
6	2.30		0.10	0.20			6.00	0.25						24.00
7	1.50		0.14	0.26	11.00	3.00	6.00	0.25						23.00
8	2.00		0.26	0.30			6.00	0.25						23.00
9	1.30		0.12	0.39			6.00	0.25						22.00
10	2.00		0.24	0.32			6.00	0.25						23.00
11	1.70		0.13	0.35			6.00	0.25						23.00
12	3.60		0.20	0.33			6.00	0.25						23.00
13	2.20		0.10	0.28			6.00	0.25						22.00
14	1.30		0.12	0.23			6.00	0.25						22.00
15	1.00		0.17	0.25			6.00	0.25						21.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
16	0.80		0.16	0.27			6.00	0.25						21.00
17	0.90		0.24	0.40			6.00	0.25						20.00
18	1.40		0.21	0.32			6.00	0.25						20.00
19	1.40		0.10	0.29			6.00	0.25						20.00
20	2.20		0.10	0.18			6.00	0.25						21.00
21	1.00		0.15	0.24			6.00	0.25						20.00
22	1.40		0.12	0.25			6.00	0.25						20.00
23	1.00		0.13	0.23			6.00	0.25						19.00
24	1.00		0.13	0.25			6.00	0.25						17.00
25	2.90		0.25	0.29			6.00	0.25						17.00
26	1.20		0.12	0.27			6.00	0.25						17.00
27	1.10		0.12	0.27			6.00	0.25						17.00
28	1.00		0.10	0.26			6.00	0.25						18.00
29	0.80		0.15	0.27			6.00	0.25						18.00
30	1.00		0.10	0.27			6.00	0.25						18.00
31														

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	1.20		0.24	0.38			6.00	0.25						19.00
2	1.60		0.28	0.35			6.00	0.25						20.00
3	1.80		0.14	0.28			3.00	0.25						19.00
4	1.60		0.13	0.36			3.00	0.25						19.00
5	1.20		0.18	0.35	11.00	1.00	6.00	0.25						19.00
6	1.60		0.16	0.33			6.00	0.25						19.00
7	1.40		0.13	0.32			6.00	0.25						18.00
8	1.40		0.12	0.35			6.00	0.25						18.00
9	1.70		0.17	0.33			6.00	0.25						18.00
10	2.10		0.11	0.27			6.00	0.25						17.00
11	1.70		0.12	0.32			6.00	0.25						16.00
12	1.00		0.18	0.25			6.00	0.25						16.00
13	1.20		0.10	0.25			6.00	0.25						17.00
14	1.00		0.12	0.26			6.00	0.25						17.00
15	6.20		0.24	0.27			6.00	0.25						17.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP.
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	(DEG.C)
16	8.90		0.28	0.30			6.00	0.25						17.00
17	4.20		0.25	0.28			6.00	0.25						16.00
18	4.00		0.20	0.22			6.00	0.25						16.00
19	2.40		0.14	0.22			6.00	0.25						16.00
20	2.00		0.15	0.23			6.00	0.25						16.00
21	2.00		0.12	0.22			6.00	0.25						15.00
22	1.70		0.18	0.24			6.00	0.25						16.00
23	1.80		0.21	0.27			6.00	0.25						16.00
24	1.70		0.15	0.23			6.00	0.25						15.00
25	3.00		0.12	0.18			6.00	0.25						15.00
26	2.00		0.11	0.20			6.00	0.25						15.00
27	2.80		0.12	0.19			6.00	0.25						15.00
28	2.80		0.13	0.19			6.00	0.25						14.00
29	5.50		0.12	0.20			6.00	0.25						14.00
30	5.10		0.15	0.19			6.00	0.25						14.00
31	4.00		0.13	0.17			6.00	0.25						14.00

Source: WTP Utility Monitoring Records, Sheets B1,.B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

TABLE 2.1: PARTICULATE REMOVAL PROFILE (NOVEMBER, 1983)

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP.
	Raw	Set.	Filter	Treat.	Raw	Set.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	(DEG.C)
1	5.00		0.13	0.17			6.00	0.25						14.00
2	4.00		0.14	0.16			6.00	0.25						14.00
3	9.40		0.14	0.17			6.00	0.25						14.00
4	5.00		0.15	0.16			6.00	0.25						14.00
5	6.20		0.21	0.23			6.00	0.25						14.00
6	6.80		0.22	0.25			6.00	0.25						14.00
7	3.50		0.13	0.22			6.00	0.25						14.00
8	20.00		0.10	0.16			9.00	0.25						13.00
9	13.00		0.08	0.17			9.00	0.25						14.00
10	5.00		0.11	0.16			6.00	0.25						14.00
11	3.90		0.26	0.19			6.00	0.25						13.00
12	3.60		0.25	0.17			6.00	0.25						14.00
13	12.00		0.21	0.19			6.00	0.25						13.00
14	20.00		0.13	0.17			6.00	0.25						11.00
15	15.00		0.08	0.21			6.00	0.25						11.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP.
	Raw	Set.	Filter	Treat.	Raw	Set.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	(DEG.C)
16	12.00		0.10	0.17	4.00	1.00	6.00	0.25						10.00
17	9.50		0.10	0.18			6.00	0.25						12.00
18	18.00		0.15	0.16			6.00	0.25						11.00
19	12.00		0.19	0.19			6.00	0.25						11.00
20	14.00		0.14	0.17			6.00	0.25						11.00
21	10.00		0.15	0.17			6.00	0.25						11.00
22	8.50		0.12	0.16			6.00	0.25						11.00
23	12.00		0.15	0.17			6.00	0.25						11.00
24	8.80		0.10	0.17			6.00	0.25						11.00
25	12.00		0.11	0.21			6.00	0.25						11.00
26	10.00		0.17	0.22			6.00	0.25						11.00
27	17.00		0.16	0.19			6.00	0.25						11.00
28	23.00		0.17	0.19			9.00	0.25						9.00
29	25.00		0.11	0.21			9.00	0.25						10.00
30	18.00		0.18	0.27			9.00	0.25						10.00
31														

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

TABLE 2.1: PARTICULATE REMOVAL PROFILE (DECEMBER, 1983)

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	30.00		0.16	0.22			9.00	0.25						9.00
2	40.00		0.15	0.20			15.00	0.38						8.00
3	28.00		0.18	0.22			15.00	0.38						9.00
4	26.00		0.19	0.27			15.00	0.38						9.00
5	23.00		0.22	0.23			9.00	0.25						9.00
6	23.00		0.16	0.23			9.00	0.25						8.00
7	24.00		0.19	0.24	25.00	1.00	9.00	0.25						7.00
8	13.00		0.15	0.24			9.00	0.25						9.00
9	18.00		0.14	0.20			9.00	0.25						8.00
10	16.00		0.14	0.18			9.00	0.25						8.00
11	14.00		0.16	0.22			9.00	0.25						8.00
12	16.00		0.17	0.20			6.00	0.25						7.00
13	23.00		0.12	0.19			9.00	0.25						7.00
14														
15	120.00		0.20	0.26			30.00	0.70						7.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP.
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	(DEG.C)
16	85.00		0.16	0.32			30.00	0.50						7.00
17	48.00		0.20	0.28			24.00	0.50						7.00
18	45.00		0.18	0.31			24.00	0.35						7.00
19	90.00		0.20	0.32			24.00	0.50						9.00
20	55.00		0.25	0.32			24.00	0.50						7.00
21	55.00		0.25	0.35			24.00	0.50						6.00
22	48.00		0.30	0.40			24.00	0.50						6.00
23	50.00		0.24	0.50			24.00	0.35						6.00
24	38.00		0.19	0.38			24.00	0.35						6.00
25	25.00		0.25	0.48			24.00	0.35						6.00
26	22.00		0.75	2.50			24.00	0.35						5.00
27	18.00		0.18	1.10			9.00	0.25						6.00
28	21.00		0.33	1.10			6.00	0.25						6.00
29	20.00		0.23	0.70			6.00	0.30						6.00
30	16.00		0.23	0.63			6.00	0.30						6.00
31	15.00		0.16	0.54			6.00	0.30						6.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

TABLE 2.1: PARTICULATE REMOVAL PROFILE (JANUARY, 1984)

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	13.00		0.17	0.43			6.00	0.30						7.00
2	13.00		0.18	0.42			6.00	0.30						7.00
3	11.00		0.17	0.41			6.00	0.25						7.00
4	13.00		0.20	0.50			6.00	0.25						7.00
5	10.00		0.15	0.36			6.00	0.25						8.00
6	10.00		0.20	0.30			6.00	0.25						7.00
7	8.70		0.22	0.39			6.00	0.25						7.00
8	8.70		0.18	0.36			6.00	0.25						7.00
9	8.20		0.14	0.33			6.00	0.25						7.00
10	7.80		0.15	0.30			6.00	0.25						8.00
11	7.00		0.16	0.30			6.00	0.25						7.00
12	6.50		0.15	0.30			6.00	0.25						7.00
13	17.00		0.18	0.30			6.00	0.25						7.00
14	6.70		0.17	0.31			6.00	0.25						6.00
15	5.30		0.18	0.30			6.00	0.25						6.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP.
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	(DEG.C)
16	6.20		0.17	0.30			6.00	0.35						6.00
17	5.20		0.11	0.28			6.00	0.35						6.00
18	5.50		0.12	0.30			6.00	0.35						6.00
19	4.40		0.18	0.29			6.00	0.35						7.00
20	4.70		0.18	0.30			6.00	0.35						7.00
21	4.60		0.17	0.32			6.00	0.35						6.00
22	3.50		0.16	0.32			6.00	0.35						6.00
23	3.80		0.16	0.30			6.00	0.35						7.00
24	4.20		0.15	0.32			3.00	0.35						6.00
25	3.60		0.13	0.29			3.00	0.35						6.00
26	3.50		0.20	0.28			3.00	0.35						6.00
27	3.50		0.18	0.30			3.00	0.35						7.00
28	3.90		0.16	0.33			3.00	0.35						7.00
29	3.50		0.15	0.31			3.00	0.35						6.00
30	3.00		0.10	0.27			3.00	0.35						6.00
31	3.20		0.12	0.26			3.00	0.35						6.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

TABLE 2.1: PARTICULATE REMOVAL PROFILE (FEBRUARY, 1984)

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	3.00		0.12	0.28	8.00	<1.00	3.00	0.35				7.50	7.40	6.00
2	2.80		0.11	0.28			3.00	0.35						6.00
3	3.40		0.18	0.30			3.00	0.35						6.00
4	3.00		0.13	0.24			3.00	0.35						6.00
5	2.80		0.18	0.25			3.00	0.35						6.00
6	3.40		0.15	0.25			3.00	0.35						6.00
7	3.10		0.11	0.28			3.00	0.35						6.00
8	3.00		0.13	0.23			3.00	0.35						6.00
9	2.90		0.11	0.26			3.00	0.35						6.00
10	3.00		0.13	0.26			3.00	0.35						6.00
11	2.80		0.13	0.25			3.00	0.35						6.00
12	2.80		0.15	0.26			3.00	0.35						6.00
13	2.30		0.15	0.23			3.00	0.35						6.00
14	3.00		0.12	0.23			3.00	0.35						6.00
15	3.40		0.13	0.23			3.00	0.35						6.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
16	27.00		0.17	0.26			9.00	0.35						6.00
17	125.00		0.17	0.25			42.00	0.85						5.00
18	125.00		0.20	0.36			42.00	0.85						6.00
19	100.00		0.10	0.33			42.00	0.85						6.00
20	80.00		0.18	0.35			24.00	0.50						6.00
21	65.00		0.20	0.65			24.00	0.50						6.00
22	58.00		0.15	0.44			21.00	0.50						5.00
23	50.00		0.18	0.42			21.00	0.50						6.00
24	35.00		0.20	0.43			15.00	0.40						6.00
25	19.00		0.21	0.38			15.00	0.40						6.00
26	32.00		0.23	0.45			15.00	0.40						6.00
27	36.00		0.22	0.40			12.00	0.40						6.00
28	25.00		0.15	0.35			9.00	0.40						5.00
29	26.00		0.15	0.39			9.00	0.40						6.00
30														
31														

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	27.00		0.15	0.38			9.00	0.40						6.00
2	25.00		0.20	0.45			9.00	0.40						5.00
3	19.00		0.17	0.38			9.00	0.40						6.00
4	17.00		0.32	0.45			9.00	0.40						6.00
5	18.00		0.23	0.34			9.00	0.40						6.00
6	17.00		0.22	0.30			9.00	0.40						6.00
7	17.00		0.16	0.26	17.00	1.00	9.00	0.40						6.00
8	17.00		0.17	0.27			6.00	0.40						6.00
9	13.00		0.18	0.26			6.00	0.40						6.00
10	11.00		0.19	0.27			6.00	0.40						6.00
11	12.00		0.16	0.35			6.00	0.40						6.00
12	6.00		0.16	0.36			4.00	0.30						6.00
13	5.00		0.16	0.35			4.00	0.30						6.00
14	4.00		0.10	0.38			4.00	0.30						6.00
15	5.00		0.15	0.30			4.00	0.30						6.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
16	4.00		0.15	0.25			4.00	0.30						6.00
17	3.50		2.00	0.32			4.00	0.30						6.00
18	3.00		0.16	0.31			4.00	0.30						6.00
19	12.00		0.16	0.30			4.00	0.30						6.00
20	25.00		0.15	0.25			9.00	0.30						6.00
21	220.00		0.20	0.30			48.00	1.00						6.00
22	200.00		0.30	0.40			48.00	1.00						6.00
23	175.00		0.55	1.50			48.00	1.00						6.00
24	110.00		0.64	2.70			48.00	1.00						5.00
25	200.00		0.42	3.00			48.00	1.00						3.00
26	230.00		0.30	4.00			42.00	1.00						3.00
27	150.00		0.36	4.00			39.00	0.85						4.00
28	125.00		0.27	4.10			30.00	0.75						4.00
29	80.00		0.25	3.30			24.00	0.50						5.00
30	175.00		0.19	2.00			36.00	0.75						5.00
31	160.00		0.20	2.00			36.00	0.75						5.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	150.00		0.20	1.00			30.00	0.75						5.00
2	85.00		0.17	1.00			24.00	0.50						6.00
3	95.00		0.20	0.85			27.00	0.50						6.00
4	75.00		0.20	0.70	24.00	4.00	24.00	0.50						6.00
5	60.00		0.20	0.70			18.00	0.50						6.00
6	50.00		0.22	0.75			18.00	0.35						6.00
7	44.00		0.20	0.70			18.00	0.35						7.00
8	45.00		0.16	0.65			18.00	0.35						6.00
9	25.00		0.17	0.45			9.00	0.35						6.00
10	23.00		0.15	0.38			9.00	0.35						7.00
11	28.00		0.14	0.40			9.00	0.35						7.00
12	43.00		0.17	0.33			15.00	0.35						7.00
13	35.00		0.17	0.38			12.00	0.35						8.00
14	31.00		0.17	0.31			12.00	0.35						8.00
15	29.00		0.18	0.36			12.00	0.35						9.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP.
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	(DEG.C)
16	25.00		0.20	0.40			9.00	0.35						9.00
17	17.00		0.15	0.37			6.00	0.25						9.00
18	30.00		0.15	0.30			12.00	0.35						8.00
19	23.00		0.15	0.30			9.00	0.25						8.00
20	17.00		0.18	0.34			9.00	0.25						8.00
21	12.00		0.20	0.31			9.00	0.25						9.00
22	14.00		0.21	0.38			9.00	0.25						9.00
23	14.00		0.18	0.60			9.00	0.25						8.00
24	15.00		0.28	0.38			9.00	0.25						8.00
25	30.00		0.25	0.30			12.00	0.25						8.00
26	25.00		0.20	0.33			12.00	0.25						8.00
27	20.00		0.15	0.30			9.00	0.25						8.00
28	15.00		0.21	0.28			9.00	0.25						8.00
29	13.00		0.28	0.31			9.00	0.25						8.00
30	13.00		0.12	0.25			9.00	0.25						10.00
31														

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	27.00		0.15	0.25			9.00	0.35						11.00
2	85.00		0.17	0.27			18.00	0.50						10.00
3	55.00		0.15	0.26			18.00	0.35						10.00
4	28.00		0.16	0.26			9.00	0.25						10.00
5	22.00		0.17	0.22			9.00	0.25						10.00
6	27.00		0.15	0.25			9.00	0.25						10.00
7	20.00		0.14	0.25			6.00	0.25						11.00
8	16.00		0.17	0.30			6.00	0.25						11.00
9	14.00		0.18	0.36	10.00	1.00	6.00	0.25						14.00
10	16.00		0.15	0.30			6.00	0.25						11.00
11	19.00		0.19	0.31			6.00	0.25						12.00
12	16.00		0.27	0.32			6.00	0.25						12.00
13	12.00		0.19	0.34			6.00	0.25						12.00
14	10.00		0.20	0.26			6.00	0.25						12.00
15	7.50		0.15	0.22			6.00	0.25						12.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP.
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	(DEG.C)
16	6.00		0.15	0.22			6.00	0.25						11.00
17	4.50		0.16	0.25			6.00	0.25						11.00
18	5.00		0.18	0.26			6.00	0.25						11.00
19	9.00		0.16	0.30			6.00	0.25						11.00
20	12.00		0.21	0.26			6.00	0.25						11.00
21	14.00		0.16	0.22			6.00	0.25						12.00
22	7.00		0.16	0.23			6.00	0.25						14.00
23	9.00		0.18	0.28			6.00	0.25						16.00
24	9.00		0.18	0.22			6.00	0.25						16.00
25	7.00		0.16	0.26			6.00	0.25						16.00
26	9.00		0.17	0.28			6.00	0.25						16.00
27	8.50		0.23	0.34			6.00	0.25						17.00
28	6.00		0.20	0.25			6.00	0.25						17.00
29	4.00		0.19	0.26			6.00	0.25						15.00
30	2.50		0.18	0.29			6.00	0.25						14.00
31	6.00		0.20	0.29			6.00	0.25						13.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	4.00		0.20	0.30			0.40	0.25						13.00
2	3.60		0.25	0.31			0.40	0.25						13.00
3	5.20		0.31	0.34			0.40	0.25						13.00
4	3.50		0.18	0.32			0.40	0.25						16.00
5	2.50		0.19	0.32			0.40	0.25						16.00
6	4.50		0.17	0.28	14.00	2.00	0.30	0.25				8.20	7.60	18.00
7	4.00		0.17	0.24			0.30	0.25						18.00
8	3.50		0.19	0.27			0.30	0.25						20.00
9	4.00		0.25	0.35			3.00	0.25						20.00
10	6.00		0.25	0.31			3.00	0.25						21.00
11	3.00		0.22	0.32			3.00	0.25						21.00
12	4.00		0.30	0.70			3.00	0.30						21.00
13	3.00		0.29	0.70			3.00	0.30						21.00
14	3.20		0.24	0.70			3.00	0.30						20.00
15	2.00		0.20	0.60			3.00	0.30						19.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
16	5.30		0.17	0.41			3.00	0.30						20.00
17	5.20		0.25	0.45			3.00	0.30						20.00
18	4.50		0.28	0.50			3.00	0.30						20.00
19	5.00		0.20	0.50			6.00	0.30						21.00
20	5.00		0.22	0.45			6.00	0.30						21.00
21	6.00		0.20	0.35			6.00	0.30						21.00
22	4.50		0.25	0.45			3.00	0.25						21.00
23	8.20		0.36	0.41			3.00	0.25						21.00
24	4.40		0.21	0.49			3.00	0.25						21.00
25	6.50		0.25	0.45			3.00	0.25						21.00
26	5.00		0.22	0.45			3.00	0.25						20.00
27	5.00		0.27	0.50			3.00	0.25						21.00
28	4.50		0.25	0.45			3.00	0.25						20.00
29	4.50		0.25	0.45			3.00	0.25						20.00
30	3.60		0.29	0.43			3.00	0.25						21.00
31														

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	3.20		0.31	0.42			4.00	0.25						21.00
2	4.00		0.34	0.39			4.00	0.25						21.00
3	2.80		0.20	0.55			3.00	0.25						22.00
4	3.00		0.25	0.40			3.00	0.25						22.00
5	3.00		0.22	0.35			3.00	0.25						22.00
6	5.50		0.27	0.40			3.00	0.25						22.00
7	3.80		0.27	0.37			3.00	0.25						21.00
8	4.40		0.25	0.32			3.00	0.25						20.00
9	4.00		0.27	0.32			3.00	0.25						20.00
10	3.00		0.26	0.45		3.00	3.00	0.25				8.30	7.40	20.00
11	2.50		0.20	0.40			3.00	0.25						21.00
12	3.40		0.22	0.34			3.00	0.25						21.00
13	2.50		0.23	0.35			3.00	0.25						21.00
14	2.30		0.24	0.33			3.00	0.25						21.00
15	2.50		0.25	0.38			3.00	0.25						22.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
16	6.00		0.22	0.43			3.00	0.25						24.00
17	6.50		0.18	0.36			3.00	0.25						24.00
18	3.50		0.25	0.40			3.00	0.25						22.00
19	2.00		0.27	0.40			3.00	0.25						21.00
20	2.50		0.18	0.35			3.00	0.25						21.00
21	2.40		0.21	0.36			3.00	0.25						21.00
22	2.30		0.20	0.36			3.00	0.25						22.00
23	5.00		0.25	0.38			3.00	0.25						23.00
24	6.20		0.23	0.35			3.00	0.25						24.00
25	4.00		0.18	0.38			3.00	0.25						24.00
26	3.80		0.22	0.40			3.00	0.25						24.00
27	3.50		0.21	0.40			3.00	0.25						23.00
28	2.20		0.22	0.42			3.00	0.25						22.00
29	4.30		0.25	0.36			3.00	0.25						22.00
30	2.70		0.24	0.42			3.00	0.25						22.00
31	4.20		0.18	0.36			3.00	0.25						22.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

TABLE 2.1: PARTICULATE REMOVAL PROFILE (AUGUST, 1984)

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	2.50		0.41	0.33			3.00	0.25						22.00
2	2.30		0.17	0.38			3.00	0.25						23.00
3	7.00		0.17	0.38			3.00	0.25						24.00
4	4.20		0.20	0.32			3.00	0.25						24.00
5	3.10		0.29	0.41			3.00	0.25						24.00
6	1.80		0.24	0.38			3.00	0.25						24.00
7	5.70		0.22	0.33			3.00	0.25						24.00
8	3.40		0.22	0.32	9.00	<1.00	3.00	0.25						25.00
9	3.20		0.18	0.32			3.00	0.25						25.00
10	3.10		0.22	0.39			3.00	0.25						25.00
11	2.00		0.28	0.41			3.00	0.25						25.00
12	1.80		0.38	0.46			3.00	0.25						25.00
13	5.00		0.23	0.45			3.00	0.25						24.00
14	3.10		0.19	0.32			3.00	0.25						24.00
15	3.20		0.23	0.40			3.00	0.25						24.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP.
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	(DEG.C)
16	4.00		0.25	0.35			3.00	0.25						24.00
17	16.00		0.20	0.35			6.00	0.25						24.00
18	12.00		0.26	0.41			6.00	0.25						24.00
19	7.00		0.37	0.47			6.00	0.25						24.00
20	2.50		0.22	0.42			3.00	0.25						23.00
21	5.00		0.23	0.43			3.00	0.25						22.00
22	4.50		0.23	0.42			3.00	0.25						23.00
23	5.50		0.23	0.35			3.00	0.25						23.00
24	1.50		0.20	0.35			3.00	0.25						22.00
25	2.10		0.21	0.36			3.00	0.25						22.00
26	2.50		0.21	0.34			3.00	0.25						22.00
27	3.50		0.25	0.35			3.00	0.25						22.00
28	4.00		0.18	0.40			3.00	0.25						22.00
29	5.00		0.23	0.33			3.00	0.25						22.00
30	3.00		0.21	0.35			3.00	0.25						23.00
31	3.00		0.21	0.40			3.00	0.25						22.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	1.90		0.25	0.37			3.00	0.25						22.00
2	2.00		0.25	0.36			3.00	0.25						22.00
3	3.20		0.25	0.28			3.00	0.25						22.00
4	2.00		0.22	0.39			3.00	0.25						21.00
5	1.20		0.18	0.33			3.00	0.25						21.00
6	1.20		0.14	0.35			3.00	0.25						20.00
7	4.50		0.20	0.40			3.00	0.25						19.00
8	2.00		0.25	0.40			3.00	0.25						20.00
9	2.20		0.24	0.41			3.00	0.25						20.00
10	3.50		0.23	0.55			3.00	0.25						19.00
11	1.00		0.25	0.55			3.00	0.25						20.00
12	1.20		0.16	0.50	12.00	1.00	3.00	0.25						20.00
13	2.00		0.18	0.55			3.00	0.25						20.00
14	1.50		0.15	0.40			3.00	0.25						20.00
15	1.40		0.16	0.24			3.00	0.25						20.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
16	2.30		2.10	0.32			3.00	0.25						20.00
17	3.50		0.22	0.30			3.00	0.25						18.00
18	1.80		0.16	0.26			3.00	0.25						18.00
19	1.50		0.15	0.67			3.00	0.25						18.00
20	1.50		0.15	0.30			3.00	0.30						19.00
21	1.80		0.15	0.23			3.00	0.30						19.00
22	1.50		0.21	0.36			3.00	0.30						19.00
23	1.60		0.24	0.40			3.00	0.30						20.00
24	2.40		0.16	0.22			3.00	0.30						19.00
25	1.50		0.17	0.25			3.00	0.30						20.00
26	1.50		0.15	0.25			3.00	0.30						20.00
27	2.00		0.15	0.25			3.00	0.30						19.00
28	1.00		0.12	0.24			3.00	0.30						18.00
29	1.30		0.17	0.32			3.00	0.30						18.00
30	1.20		0.17	0.31			3.00	0.30						17.00
31														

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	1.00		0.13	0.23			3.00	0.30						17.00
2	1.00		0.18	0.22			3.00	0.30						16.00
3	1.00		0.15	0.24			3.00	0.30						17.00
4	2.70		0.17	0.20			3.00	0.30						16.00
5	1.20		0.17	0.30			3.00	0.30						16.00
6	2.00		0.22	0.29			3.00	0.30						16.00
7	2.20		0.30	0.34			3.00	0.30						16.00
8	1.70		0.17	0.38			3.00	0.30						16.00
9	9.00		0.21	0.27			3.00	0.30						16.00
10	1.50		0.16	0.27	8.00		3.00	0.30						16.00
11	1.50		0.15	0.26			3.00	0.30						17.00
12	1.20		0.15	0.25			3.00	0.30						17.00
13	1.30		0.15	0.23			3.00	0.30						16.00
14	2.40		0.22	0.31			3.00	0.30						17.00
15	1.50		0.16	0.26			3.00	0.30						17.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
16	1.50		0.15	0.30			3.00	0.30						17.00
17	1.50		0.16	0.27			3.00	0.30						17.00
18	1.40		0.15	0.26			3.00	0.30						17.00
19	1.80		0.15	0.26			3.00	0.30						17.00
20	1.30		0.20	0.33			3.00	0.30						17.00
21	2.10		0.21	0.28			3.00	0.30						17.00
22	3.30		0.18	0.22			3.00	0.30						16.00
23	2.50		0.17	0.23			3.00	0.30						16.00
24	2.00		0.20	0.25			3.00	0.30						16.00
25	1.00		0.18	0.27			3.00	0.30						16.00
26	1.50		0.18	0.25			3.00	0.30						16.00
27	2.20		0.22	0.24			3.00	0.30						16.00
28	8.10		0.33	0.35			3.00	0.30						16.00
29	3.20		0.16	0.22			3.00	0.30						16.00
30	2.00		0.18	0.25			3.00	0.30						16.00
31	1.50		0.15	0.25			3.00	0.30						16.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

TABLE 2.1: PARTICULATE REMOVAL PROFILE (NOVEMBER, 1984)

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	1.50		0.16	0.30			3.00	0.30						16.00
2	2.00		0.19	0.30			3.00	0.30						15.00
3	2.40		0.18	0.27			3.00	0.30						14.00
4	3.10		0.17	0.24			3.00	0.30						14.00
5	5.00		0.16	0.23			3.00	0.30						14.00
6	4.30		0.17	0.24			3.00	0.30						14.00
7	4.50		0.16	0.24			3.00	0.30						13.00
8	3.20		0.17	0.23			3.00	0.30						13.00
9	2.30		0.17	0.24			3.00	0.30						14.00
10	3.00		0.17	0.26			3.00	0.30						14.00
11	3.00		0.16	0.24			3.00	0.30						14.00
12	7.40		0.16	0.25			3.00	0.30						12.00
13	5.00		0.18	0.27			3.00	0.30						12.00
14	4.50		0.18	0.26	9.00	5.00	3.00	0.30						13.00
15	12.00		0.20	0.09			6.00	0.30						11.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
16	8.00		0.20	0.32			6.00	0.30						12.00
17	6.40		0.30	0.44			6.00	0.30						12.00
18	22.00		0.31	0.51			6.00	0.30						12.00
19	28.00		0.22	0.50			9.00	0.40						11.00
20	25.00		0.25	0.38			9.00	0.40						11.00
21	45.00		0.40	0.60			18.00	0.45						10.00
22	50.00		0.25	0.43			18.00	0.50						10.00
23	30.00		0.20	0.45			12.00	0.40						10.00
24	22.00		0.22	0.47			6.00	0.30						9.00
25	21.00		0.21	0.45			6.00	0.30						10.00
26	22.00		0.25	0.40			6.00	0.35						10.00
27	20.00		0.25	0.47			9.00	0.35						9.00
28	23.00		0.20	0.42			9.00	0.35						9.00
29	18.00		0.20	0.45			9.00	0.35						10.00
30	18.00		0.18	0.46			6.00	0.35						10.00
31														

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	18.00		0.21	0.31			6.00	0.35						10.00
2	20.00		0.27	0.36			9.00	0.35						10.00
3	25.00		0.18	0.30			9.00	0.35						9.00
4	22.00		0.18	0.29	22.00		9.00	0.35						9.00
5	19.00		0.25	0.44		3.00	9.00	0.35						9.00
6	30.00		0.20	0.44			9.00	0.35						8.00
7	30.00		0.19	0.41			9.00	0.35						7.00
8	32.00		0.21	0.33			9.00	0.35						7.00
9	18.00		0.30	0.38			9.00	0.35						7.00
10	13.00		0.20	0.35			6.00	0.30						8.00
11	8.00		0.20	0.27			6.00	0.30						8.00
12	12.00		0.20	0.31			6.00	0.30						8.00
13	8.00		0.20	0.33			6.00	0.30						8.00
14	7.00		0.16	0.30			6.00	0.30						8.00
15	5.00		0.22	0.35			6.00	0.30						8.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP.
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	(DEG.C)
16	5.00		0.20	0.26			6.00	0.30						8.00
17	14.00		0.20	0.25			6.00	0.30						8.00
18	12.00		0.17	0.35			6.00	0.30						8.00
19	14.00		0.16	0.43			6.00	0.30						9.00
20	10.00		0.16	0.25			6.00	0.30						8.00
21	18.00		0.15	0.40			6.00	0.30						7.00
22	20.00		0.22	0.36			9.00	0.35						8.00
23	17.00		0.20	0.34			9.00	0.35						8.00
24	25.00		0.20	0.40			9.00	0.40						7.00
25	19.00		0.22	0.33			9.00	0.40						7.00
26	21.00		0.21	0.26			9.00	0.40						7.00
27	24.00		0.36	0.36			9.00	0.40						7.00
28	36.00		0.46	0.34			9.00	0.40						7.00
29	46.00		0.66	0.31			9.00	0.40						7.00
30	36.00		0.20	0.28			9.00	0.40						7.00
31	30.00		0.20	0.34			12.00	0.40						7.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

TABLE 2.1: PARTICULATE REMOVAL PROFILE (JANUARY, 1985)

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	26.00		0.28	0.46			12.00	0.40						7.00
2	60.00		0.30	0.70			12.00	0.40						5.00
3	40.00		0.20	0.65			18.00	0.40						5.00
4	75.00		0.35	0.65			24.00	0.50						6.00
5	35.00		0.33	0.48			18.00	0.40						8.00
6	46.00		0.31	0.50			18.00	0.40						6.00
7	185.00		0.25	0.45			24.00	0.50						6.00
8	135.00		0.21	0.40			48.00	1.00						5.00
9	110.00		0.30	1.00			30.00	0.75						6.00
10	100.00		0.35	1.00			36.00	0.75						5.00
11	80.00		0.25	1.00			24.00	0.50						5.00
12	65.00		0.32	0.87			24.00	0.50						5.00
13	65.00		0.50	1.50			24.00	0.50						5.00
14	55.00		0.45	1.00			24.00	0.50						5.00
15	45.00		0.22	1.00			15.00	0.40						5.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP.
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	(DEG.C)
16	30.00		0.25	0.75	23.00	6.00	12.00	0.40						
17	35.00		0.22	0.75			18.00	0.40						5.00
18	28.00		0.23	0.67			9.00	0.40						6.00
19	22.00		0.24	0.51			9.00	0.40						6.00
20	22.00		0.26	0.52			9.00	0.40						6.00
21	18.00		0.20	0.50			6.00	0.30						6.00
22	16.00		0.35	0.65			6.00	0.30						7.00
23	14.00		0.23	0.43			6.00	0.30						5.00
24	13.00		0.22	0.43			6.00	0.30						5.00
25	13.00		0.25	0.39			6.00	0.30						6.00
26	12.00		0.24	0.40			6.00	0.30						6.00
27	12.00		0.22	0.36			6.00	0.30						6.00
28	12.00		0.22	0.40			6.00	0.30						6.00
29	11.00		0.18	0.38			6.00	0.30						7.00
30	9.00		0.16	0.43			6.00	0.30						7.00
31	10.00		0.17	0.46			6.00	0.30						7.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

TABLE 2.1: PARTICULATE REMOVAL PROFILE (FEBRUARY, 1965)

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP.
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	(DEG.C)
1	10.00		0.15	0.50			6.00	0.30						7.00
2	10.00		0.22	0.40			6.00	0.30						7.00
3	9.00		0.25	0.45			6.00	0.30						7.00
4	8.00		0.20	0.45			6.00	0.30						7.00
5	7.50		0.17	0.37			6.00	0.35						7.00
6	7.50		0.19	0.45	19.00	4.00	6.00	0.35						7.00
7	11.00		0.15	0.42			6.00	0.35						7.00
8	7.00		0.16	0.46			6.00	0.35						7.00
9	8.20		0.31	0.51			6.00	0.35						7.00
10	6.20		0.24	0.34			6.00	0.35						7.00
11	6.50		0.19	0.40			6.00	0.35						6.00
12	6.20		0.18	0.41			6.00	0.35						7.00
13	5.50		0.20	0.33			6.00	0.35						6.00
14	6.00		0.20	0.38			5.00	0.35						7.00
15	5.50		0.18	0.42			5.00	0.35						7.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP.
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	(DEG.C)
16	5.20		0.19	0.40			5.00	0.35						6.00
17	5.10		0.25	0.35			5.00	0.35						6.00
18	5.00		0.20	0.36			5.00	0.35						7.00
19	5.00		0.22	0.35			5.00	0.35						6.00
20	4.50		0.20	0.34			5.00	0.35						7.00
21	4.50		0.20	0.34			5.00	0.35						7.00
22	4.50		0.17	0.34			5.00	0.35						6.00
23	5.50		0.18	0.30			5.00	0.35						6.00
24	4.50		0.16	0.29			5.00	0.35						6.00
25	4.50		0.19	0.30			5.00	0.35						6.00
26	4.00		0.15	0.30			6.00	0.35						6.00
27	8.00		0.17	0.25			6.00	0.35						6.00
28	20.00		0.14	0.28			6.00	0.35						6.00
29														
30														
31														

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	50.00		0.17	0.30			18.00	0.42						6.00
2	45.00		0.18	0.32			18.00	0.42						6.00
3	40.00		0.16	0.34			18.00	0.42						6.00
4	32.00		0.16	0.40			12.00	0.40						6.00
5	37.00		0.18	0.45			12.00	0.40						5.00
6	37.00		0.15	0.40			12.00	0.40						6.00
7	38.00		0.15	0.34			12.00	0.40						5.00
8	26.00		0.18	0.38			12.00	0.40						5.00
9	26.00		0.25	0.35			12.00	0.40						5.00
10	26.00		0.31	0.38			12.00	0.40						5.00
11	22.00		0.30	0.45			9.00	0.40						5.00
12	24.00		0.23	0.30			9.00	0.40						5.00
13	25.00		0.23	0.35	25.00	4.00	9.00	0.40						6.00
14	60.00		0.18	0.35			9.00	0.40						6.00
15	60.00		0.17	0.36			18.00	0.50						6.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP.
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	(DEG.C)
16	40.00		0.19	0.35			18.00	0.50						6.00
17	45.00		0.22	0.31			18.00	0.50						6.00
18	45.00		0.42	0.44			18.00	0.50						6.00
19	40.00		0.21	0.40			12.00	0.40						5.00
20	30.00		0.22	0.36			12.00	0.40						5.00
21	17.00		0.23	0.30			6.00	0.30						6.00
22	23.00		0.15	0.35			6.00	0.30						6.00
23	24.00		0.17	0.27			6.00	0.30						6.00
24	22.00		0.20	0.27			6.00	0.30						6.00
25	26.00		0.15	0.30			6.00	0.30						6.00
26	25.00		0.14	0.30			6.00	0.30						6.00
27	20.00		0.18	0.40			6.00	0.30						6.00
28	45.00		0.13	0.30			12.00	0.35						6.00
29	50.00		0.18	0.25			12.00	0.35						7.00
30	70.00		0.20	0.25			12.00	0.35						7.00
31	42.00		0.17	0.23			12.00	0.35						7.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

TABLE 2.1: PARTICULATE REMOVAL PROFILE (APRIL, 1985)

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	100.00		0.18	0.33			24.00	0.50						7.00
2	100.00		0.18	0.34			30.00	0.50						7.00
3	85.00		0.20	0.35	18.00	3.00	24.00	0.50						6.00
4	175.00		0.18	0.34			24.00	0.50						7.00
5	110.00		0.22	0.35			24.00	0.50						7.00
6	220.00		0.20	0.33			42.00	1.00						7.00
7	200.00		0.20	0.36			42.00	1.00						8.00
8	90.00		0.21	0.42			30.00	0.50						8.00
9	130.00		0.18	0.43			36.00	0.70						7.00
10	130.00		0.20	0.40			42.00	1.00						7.00
11	160.00		0.20	0.45			42.00	1.00						7.00
12	85.00		0.18	0.37			27.00	0.60						7.00
13	60.00		0.23	0.43			27.00	0.60						7.00
14	45.00		0.21	0.51			15.00	0.50						8.00
15	50.00		0.17	0.40			15.00	0.50						8.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP.
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	(DEG.C)
16	50.00		0.17	0.36			15.00	0.50						9.00
17	35.00		0.16	0.35			12.00	0.35						9.00
18	35.00		0.18	0.28			12.00	0.35						9.00
19	35.00		0.18	0.32			12.00	0.35						9.00
20	41.00		0.20	0.36			12.00	0.35						10.00
21	32.00		0.19	0.31			12.00	0.35						10.00
22	33.00		0.18	0.33			12.00	0.35						10.00
23	20.00		0.15	0.30			9.00	0.35						11.00
24	17.00		0.16	0.35			6.00	0.25						11.00
25	12.00		0.18	0.36			6.00	0.25						11.00
26	12.00		0.18	0.33			6.00	0.25						11.00
27	10.00		0.20	0.34			6.00	0.25						12.00
28	10.00		0.18	0.38			6.00	0.25						12.00
29	6.00		0.16	0.40			6.00	0.25						12.00
30	5.00		0.17	0.33			6.00	0.25						11.00
31														

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

TABLE 2.1: PARTICULATE REMOVAL PROFILE (MAY, 1985)

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	5.00		0.17	0.33			6.00	0.25						11.00
2	4.00		0.19	0.40			6.00	0.25						12.00
3	3.50		0.17	0.37			6.00	0.25						12.00
4	3.70		0.26	0.36			6.00	0.25						12.00
5	12.00		0.27	0.32			6.00	0.25						12.00
6	6.00		0.16	0.25			6.00	0.25						12.00
7	8.50		0.15	0.25			6.00	0.25						12.00
8	9.00		0.25	0.31	11.00	2.00	6.00	0.25						14.00
9	10.00		0.14	0.25			6.00	0.25						13.00
10	5.00		0.19	0.23			6.00	0.25						13.00
11	6.00		0.15	0.25			6.00	0.25						18.00
12	7.50		0.16	0.20			6.00	0.25						18.00
13	6.00		0.14	0.23			6.00	0.25						16.00
14	6.70		0.19	0.28			6.00	0.25	2.50					17.00
15	2.30		0.12	0.22			6.00	0.25	2.50					16.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP.
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	(DEG.C)
16	2.50		0.15	0.25			6.00	0.25	2.50					15.00
17	5.00		0.15	0.24			6.00	0.25	2.50					16.00
18	11.00		0.15	0.23			6.00	0.25	5.00					15.00
19	6.00		0.15	0.23			6.00	0.25	5.00					15.00
20	3.50		0.16	0.72			6.00	0.25	5.00					14.00
21	5.50		0.27	0.75			6.00	0.25	10.00					16.00
22	2.00		0.16	0.45			6.00	0.25	10.00					15.00
23	1.50		0.16	0.33			6.00	0.25	10.00					15.00
24	1.80		0.14	0.27			6.00	0.25	10.00					15.00
25	5.40		0.18	0.24			6.00	0.25	10.00					15.00
26	1.80		0.20	0.89			6.00	0.25	20.00					15.00
27	2.00		0.15	0.42			4.00	0.25	20.00					16.00
28	3.50		0.15	0.25			4.00	0.25	20.00					17.00
29	3.50		0.15	0.34			4.00	0.25	20.00					16.00
30	2.50		0.15	0.34			4.00	0.25	20.00					15.00
31	2.50		0.18	0.25			4.00	0.25	20.00					15.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	8.60		0.19	0.26			4.00	0.25	20.00					18.00
2	5.60		0.16	0.23			4.00	0.25	20.00					17.00
3	5.00		0.16	0.25			4.00	0.25	30.00					18.00
4	4.20		0.18	0.25	11.00	<1.00	4.00	0.25	30.00					17.00
5	2.20		0.18	0.30			4.00	0.25	30.00					17.00
6	3.50		0.15	0.26			4.00	0.25	30.00					17.00
7	4.00		0.17	0.30			4.00	0.25	30.00					18.00
8	3.00		0.14	0.20			4.00	0.25	30.00					18.00
9	2.90		0.20	0.24			4.00	0.25	30.00					18.00
10	2.50		0.19	0.35			4.00	0.25	30.00					18.00
11	1.50		0.17	0.35			4.00	0.25	30.00					18.00
12	1.50		0.15	0.27			4.00	0.25	30.00					18.00
13	3.20		0.16	0.26			4.00	0.25	30.00					17.00
14	3.70		0.16	0.23			4.00	0.25	20.00					17.00
15	4.30		0.21	0.32			4.00	0.25	20.00					17.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP.
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	(DEG.C)
16	1.90		0.18	0.34			4.00	0.25	20.00					
17	1.70		0.16	0.29			4.00	0.25	20.00					17.00
18	1.80		0.17	0.24			4.00	0.25	20.00					16.00
19	3.10		0.18	0.24			4.00	0.25	20.00					16.00
20	2.70		0.17	0.23			4.00	0.25	10.00					16.00
21	2.90		0.18	0.24			4.00	0.25	5.00					16.00
22	4.50		0.25	0.30			4.00	0.25	5.00					17.00
23	1.90		0.22	0.27			4.00	0.25	5.00					20.00
24	1.40		0.18	0.50			4.00	0.25	5.00					18.00
25	1.50		0.15	0.40			4.00	0.25	5.00					19.00
26	1.60		0.14	0.25			4.00	0.25	5.00					19.00
27	1.00		0.13	0.25			4.00	0.25	5.00					19.00
28	1.50		0.15	0.25			4.00	0.25						18.00
29	2.00		0.15	0.22			4.00	0.25						20.00
30	1.40		0.18	0.25			4.00	0.25						20.00
31														20.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

TABLE 2.1: PARTICULATE REMOVAL PROFILE (JULY, 1985)

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	2.00		0.17	0.26			3.00	0.25						20.00
2	1.40		0.17	0.34			3.00	0.25						20.00
3	1.70		0.17	0.26	3.00	3.00	3.00	0.25						21.00
4	1.20		0.15	0.25			3.00	0.25						21.00
5	1.20		0.15	0.26			3.00	0.25						20.00
6	2.90		0.21	0.28			3.00	0.25						21.00
7	6.70		0.20	0.31			3.00	0.25						22.00
8	2.00		0.18	0.30			3.00	0.25						22.00
9	2.50		0.20	0.35			3.00	0.25						22.00
10	1.30		0.22	0.30			3.00	0.25						22.00
11	2.50		0.26	0.35			3.00	0.25						22.00
12	1.20		0.14	0.30			3.00	0.25						22.00
13	1.50		0.24	0.36			3.00	0.25						22.00
14	6.00		0.30	0.48			3.00	0.25						23.00
15	1.50		0.15	0.37			3.00	0.25						23.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP.
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	(DEG.C)
16	2.00		0.22	0.37			3.00	0.25						23.00
17	2.00		0.17	0.27			3.00	0.25						23.00
18	3.40		0.18	0.26			3.00	0.25						23.00
19	2.50		0.17	0.25			3.00	0.25						22.00
20	2.50		0.19	0.22			3.00	0.25						23.00
21	2.00		0.25	0.34			3.00	0.25						23.00
22	4.50		0.15	0.27			3.00	0.25						24.00
23	2.00		0.20	0.27			3.00	0.25						23.00
24	3.40		0.20	0.28			3.00	0.25						23.00
25	3.00		0.18	0.28			3.00	0.25						23.00
26	3.00		0.20	0.30			3.00	0.25						23.00
27	1.90		0.23	0.32			3.00	0.25						23.00
28	6.10		0.22	0.30			3.00	0.25						24.00
29	2.50		0.22	0.28			3.00	0.25						23.00
30	3.50		0.21	0.28			3.00	0.25						24.00
31	2.50		0.22	0.32			3.00	0.25						23.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

TABLE 2.1: PARTICULATE REMOVAL PROFILE (AUGUST, 1985)

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. - Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	2.20		0.17	0.27			3.00	0.50	1.60					22.00
2	1.50		0.15	0.28			3.00	0.50	2.40					22.00
3	2.40		0.19	0.25			3.00	0.50	2.20					22.00
4	1.60		0.15	0.26			3.00	0.50	2.70					22.00
5	3.10		0.15	0.25			3.00	0.50	1.80					22.00
6	1.50		0.17	0.26			3.00	0.50	2.30					22.00
7	1.30		0.15	0.25			3.00	0.50	2.30					22.00
8	1.60		0.15	0.26			3.00	0.50	1.80					22.00
9	1.20		0.12	0.22			3.00	0.50	2.30					23.00
10	1.40		0.14	0.20			3.00	0.50	2.10					23.00
11	1.50		0.18	0.26			3.00	0.50	2.10					23.00
12	1.60		0.17	0.40			3.00	0.50	2.70					23.00
13	2.00		0.20	0.30			3.00	0.50	2.20					23.00
14	1.70		0.19	0.30			3.00	0.50	2.00					23.00
15	2.00		0.20	0.30			3.00	0.50	2.40					23.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. A1D	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
16	3.40		0.20	0.27			3.00	0.50	1.90					23.00
17	5.10		0.25	0.38			3.00	0.50	2.00					23.00
18	4.70		0.24	0.34			3.00	0.50	2.80					23.00
19	4.50		0.15	0.34			3.00	0.50	2.50					23.00
20	3.00		0.15	0.30			3.00	0.50	1.90					23.00
21	2.00		0.17	0.30			3.00	0.50	2.40					22.00
22	2.30		0.17	0.30	8.00	1.00	3.00	0.50	1.70				7.32	21.00
23	1.50		0.16	0.28			3.00	0.50	2.50					21.00
24	2.50		0.21	0.20			3.00	0.50	1.70					21.00
25	1.60		0.14	0.26			3.00	0.50	2.40					21.00
26	1.20		0.20	0.25			3.00	0.50	2.00					21.00
27	1.50		0.20	0.27			3.00	0.50	2.70					22.00
28	2.50		0.17	0.27			3.00	0.50	1.80					22.00
29	1.30		0.17	0.25			3.00	0.50	2.10					22.00
30	1.20		0.15	0.23			3.00	0.50	2.10					22.00
31	3.10		0.17	0.29			3.00	0.50	1.90					22.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	1.80		0.26	0.36			3.00	0.50	2.90					22.00
2	2.30		0.17	0.29			3.00	0.50	4.90					21.00
3	2.00		0.15	0.26			3.00	0.50	3.70					22.00
4	1.00		0.17	0.23			3.00	0.50	4.10					22.00
5	2.00		0.15	0.25			3.00	0.50	1.70					22.00
6	1.50		0.15	0.30			3.00	0.50	2.90					22.00
7	4.60		0.18	0.34			3.00	0.50	2.70					22.00
8	5.10		0.20	0.38			3.00	0.50	5.00					22.00
9	2.00		0.23	0.35			3.00	0.50	3.60					24.00
10	5.60		0.16	0.26			3.00	0.50	1.40					24.00
11	1.00		0.18	0.32			3.00	0.50	3.70					22.00
12	2.00		0.18	0.38			3.00	0.50	3.20					21.00
13	6.00		0.20	0.33			3.00	0.50	5.50					19.00
14	13.00		0.26	0.35			3.00	0.50	2.80					18.00
15	7.80		0.25	0.36			3.00	0.50	4.10					19.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
16	7.50		0.22	0.32			3.00	0.50	4.20					19.00
17	12.00		0.22	0.30			6.00	0.50	4.00					19.00
18	11.00		0.18	0.30			6.00	0.60	1.40					19.00
19	3.00		0.15	0.25			6.00	0.55	6.00					19.00
20	9.00		0.18	0.25			6.00	0.55	4.00					20.00
21	4.30		0.17	0.24			6.00	0.55	3.80					20.00
22	4.00		0.22	0.25			6.00	0.55	3.90					20.00
23	3.50		0.15	0.30			6.00	0.55	5.30					20.00
24	7.00		0.17	0.27			6.00	0.55	0.90					20.00
25	2.00		0.15	0.23			6.00	0.50	4.90					19.00
26	2.00		0.18	0.26	5.50	1.00	6.00	0.50	3.80			8.50	7.60	19.00
27	4.00		0.16	0.27			6.00	0.50	5.80					18.00
28	2.10		0.19	0.26			6.00	0.50	3.70					18.00
29	2.80		0.22	0.28			6.00	0.50	4.20					18.00
30	2.20		0.26	0.30			6.00	0.50	6.00					18.00
31														

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

TABLE 2.1: PARTICULATE REMOVAL PROFILE (OCTOBER, 1985)

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	3.10		0.20	0.32			3.00	0.50	3.00					19.00
2	2.50		0.16	0.29			3.00	0.50	4.80					18.00
3	2.60		0.16	0.26			3.00	0.50	2.70					16.00
4	3.50		0.19	0.21			3.00	0.50	5.50					16.00
5	4.60		0.18	0.25			3.00	0.50	4.40					16.00
6	13.00		0.30	0.30			3.00	0.50	2.80					14.00
7	6.90		0.22	0.36			6.00	0.50	5.70					14.00
8	4.20		0.34	0.34			3.00	0.50	4.50					16.00
9	4.00		0.26	0.35			3.00	0.50	1.40					15.00
10	4.50		0.22	0.34			3.00	0.50	4.50					16.00
11	2.50		0.26	0.33			3.00	0.50	5.80					16.00
12	2.90		0.24	0.26			3.00	0.50	5.20					16.00
13	2.30		0.18	0.28			3.00	0.50	3.50					15.00
14	3.10		0.23	0.31			3.00	0.50	3.80					15.00
15	3.00		0.22	0.26			3.00	0.50	5.30					16.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
16	6.50		0.20	0.26			3.00	0.50	3.90					15.00
17	3.00		0.15	0.23			3.00	0.50	4.40					16.00
18	1.50		0.16	0.23			3.00	0.50	6.30					15.00
19	3.90		0.22	0.31			3.00	0.50	3.30					15.00
20	3.10		0.21	0.40			3.00	0.50	4.70					15.00
21	4.00		0.18	0.25			3.00	0.50	4.80					14.00
22	3.30		0.17	0.22			3.00	0.50	3.20					14.00
23	2.50		0.17	0.25	18.00	1.50	3.00	0.50	5.00			8.40	7.20	15.00
24	8.00		0.20	0.27			6.00	0.50	3.90					15.00
25	2.50		0.18	0.27			6.00	0.50	4.40					15.00
26	2.50		0.20	0.25			6.00	0.50	4.10					16.00
27	2.70		0.21	0.26			6.00	0.50	5.80					15.00
28	3.50		0.18	0.27			3.00	0.50	5.80					15.00
29	3.50		0.20	0.25			3.00	0.50	4.60					15.00
30	6.00		0.20	0.25			3.00	0.50	4.50					15.00
31	5.10		0.19	0.21			3.00	0.50	5.50					15.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	2.50		0.20	0.30			3.00	0.50	9.50					15.00
2	4.90		0.19	0.25			3.00	0.50	5.60					13.00
3	4.80		0.17	0.28			3.00	0.50	5.90					14.00
4	13.00		0.18	0.25			3.00	0.50	6.20					14.00
5	6.00		0.19	0.22			3.00	0.50	6.50					14.00
6	6.00		0.18	0.24			3.00	0.50	7.80					14.00
7	6.50		0.16	0.24			3.00	0.50	3.00					14.00
8	6.00		0.18	0.22			3.00	0.50	3.90					14.00
9	13.00		0.21	0.38			3.00	0.50	3.20					14.00
10	12.00		0.20	0.28			3.00	0.50	3.40					14.00
11	7.50		0.26	0.33			3.00	0.50	3.10					13.00
12	8.50		0.30	0.38			6.00	0.60	3.50					12.00
13	7.50		0.20	0.28			6.00	0.50	5.10					12.00
14	12.00		0.22	0.25			6.00	0.50	5.70					11.00
15	20.00		0.22	0.28			6.00	0.50	8.30					12.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP.
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	(DEG.C)
16	27.00		0.30	0.26			6.00	0.50	2.40					12.00
17	33.00		0.30	0.39			12.00	0.75	4.50					13.00
18	40.00		0.25	0.40			15.00	0.75	7.50					11.00
19	53.00		0.28	0.41			15.00	0.75	4.50					11.00
20	40.00		0.25	0.31			18.00	0.75	5.90					12.00
21	35.00		0.35	0.36			12.00	0.75	4.70					12.00
22	30.00		0.25	0.55			9.00	0.75	7.40					11.00
23	28.00		0.24	0.38			9.00	0.75	4.10					10.00
24	28.00		0.26	0.38			9.00	0.75	4.80					11.00
25	35.00		0.27	0.50			9.00	0.75	5.30					10.00
26	50.00		0.25	0.65			12.00	0.75	5.40					9.00
27	60.00		0.25	0.60			18.00	0.75	5.20					8.00
28	45.00		0.26	0.37	9.50	3.00	18.00	0.75	6.00			8.20	7.30	9.00
29	40.00		0.23	0.30			12.00	0.75	3.60					9.00
30	43.00		0.25	0.33			12.00	0.75	5.00					9.00
31														

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	32.00		0.27	0.45			12.00	0.75	6.10					9.00
2	40.00		0.45	0.90			12.00	0.75	7.80					9.00
3	80.00		0.35	0.85			30.00	1.00	2.20					5.00
4	55.00		0.22	0.60			18.00	1.00	6.90					6.00
5	55.00		0.22	0.80			18.00	0.80	4.60					7.00
6	55.00		0.25	0.65			18.00	0.80	7.80					7.00
7	33.00		0.23	0.66			6.00	0.50	4.40					11.00
8	12.00		0.40	0.58			6.00	0.50	4.50					10.00
9	45.00		0.30	0.43			21.00	1.00	8.00					8.00
10	60.00		0.35	0.43			21.00	1.00	3.40					7.00
11	55.00		0.35	0.42	31.00	1.50	21.00	1.00	7.70			8.10	7.50	6.00
12	50.00		0.35	0.44			18.00	0.80	4.00					7.00
13	40.00		0.35	0.40			12.00	0.75	8.20					6.00
14	44.00		0.33	0.35			12.00	0.75	4.00					6.00
15	36.00		0.31	0.32			12.00	0.75	5.50					6.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP.
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	(DEG.C)
16	30.00		0.25	0.30			9.00	0.75	8.00					6.00
17	20.00		0.25	0.32			9.00	0.60	4.50					6.00
18	18.00		0.24	0.33			9.00	0.60	5.00					6.00
19	15.00		0.20	0.32			9.00	0.60	5.00					7.00
20	15.00		0.21	0.28			9.00	0.60	5.50					6.00
21	24.00		0.27	0.31			9.00	0.60	4.60					6.00
22	12.00		0.24	0.35			9.00	0.60	5.40					7.00
23	12.00		0.26	0.32			6.00	0.50	5.70					7.00
24	12.00		0.23	0.32			9.00	0.60	3.80					6.00
25	6.00		0.25	0.30			9.00	0.60	6.00					6.00
26	7.00		0.31	0.38			9.00	0.60	6.30					6.00
27	9.50		0.20	0.26			9.00	0.60	5.30					5.00
28	10.00		0.24	0.31			9.00	0.60	1.80					7.00
29	10.00		0.29	0.40			9.00	0.60	5.50					8.00
30	12.00		0.20	0.35			9.00	0.60	3.90					7.00
31	10.00		0.23	0.33			9.00	0.60	8.20					7.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. AI (mg/L)		pH		TEMP.
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	(DEG.C)
1	9.00		0.25	0.32			50.00	0.60	3.70					6.00
2	8.40		0.25	0.27			50.00	0.60	5.30					7.00
3	9.20		0.22	0.30			50.00	0.60	5.40					6.00
4	8.10		0.28	0.35			50.00	0.60	4.90					6.00
5	7.50		0.25	0.35			50.00	0.60	5.00					7.00
6	7.50		0.25	0.40			50.00	0.60	5.70			7.50		6.00
7	7.50		0.27	0.36			50.00	0.60	5.20					6.00
8	7.00		0.22	0.40			50.00	0.60	3.20					6.00
9	7.50		0.25	0.43			50.00	0.60	5.20					6.00
10	7.00		0.25	0.40			50.00	0.60	5.30					6.00
11	6.70		0.25	0.42			50.00	0.60	6.20					6.00
12	6.50		0.27	0.47			50.00	0.60	4.00					6.00
13	6.00		0.25	0.40			50.00	0.60	5.00					7.00
14	5.50		0.27	0.40			50.00	0.60	5.00					7.00
15	5.50		0.23	0.42			50.00	0.60	5.00					6.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
16	5.50		0.22	0.45			50.00	0.60	4.30					7.00
17	5.00		0.20	0.43			50.00	0.60	6.70					6.00
18	4.50		0.24	0.42			50.00	0.60	3.40					7.00
19	5.00		0.28	0.44			50.00	0.60	4.50					7.00
20	6.00		0.25	0.45			50.00	0.65	4.50					7.00
21	7.00		0.20	0.43			50.00	0.65	4.50					6.00
22	5.00		0.25	0.43			50.00	0.65	4.30					6.00
23	12.00		0.25	0.40			50.00	0.65	4.50					7.00
24	15.00		0.28	0.35			50.00	0.65	5.70					5.00
25	30.00		0.35	0.37			120.00	0.75	6.10					5.00
26	35.00		0.32	0.34			120.00	0.75	4.50					5.00
27	38.00		0.25	0.35			120.00	0.75	4.80					5.00
28	35.00		0.24	0.31			120.00	0.75	5.50					5.00
29	25.00		0.25	0.32			50.00	0.75	3.40					6.00
30	24.00		0.28	0.39			50.00	0.75	6.00					5.00
31	23.00		0.25	0.35			50.00	0.75	5.30					6.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	14.00		0.24	0.34			94.00	0.75	4.60					6.00
2	12.00		0.24	0.38			94.00	0.75	4.10					6.00
3	8.50		0.22	0.36			94.00	0.65	5.00					6.00
4	9.00		0.25	0.32			94.00	0.65	4.10					6.00
5	12.00		0.26	0.30			94.00	0.65	4.80					5.00
6	12.00		0.30	0.60			94.00	0.65	3.70					5.00
7	15.00		0.30	0.55			94.00	0.65	6.20					5.00
8	12.00		0.40	0.50			94.00	0.65	3.60					7.00
9	13.00		0.28	0.51			94.00	0.65	3.40					6.00
10	13.00		0.30	0.43			94.00	0.65	4.20					6.00
11	11.00		0.19	0.39			94.00	0.65	3.40					5.00
12	9.00		0.21	0.35			94.00	0.65	5.00					6.00
13	8.50		0.22	0.33			94.00	0.65	5.20					5.00
14	8.50		0.25	0.31			94.00	0.65	8.40					5.00
15	9.50		0.25	0.36			94.00	0.65	4.70					6.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
16	7.50		0.31	0.38			94.00	0.65	5.80					6.00
17	8.50		0.25	0.33			94.00	0.65	6.50			7.50		5.00
18	7.50		0.22	0.34			94.00	0.65	6.70					6.00
19	9.00		0.20	0.33			94.00	0.65	6.00					5.00
20	8.00		0.25	0.29			114.00	0.65	4.50					5.00
21	7.00		0.25	0.30			114.00	0.65	5.00					5.00
22	7.00		0.26	0.34			114.00	0.65	3.80					5.00
23	7.40		0.30	0.38			114.00	0.65	7.20					5.00
24	12.00		0.20	0.27			114.00	0.65	5.10					5.00
25	13.00		0.23	0.28			114.00	0.60	5.70					5.00
26	12.00		0.25	0.32			68.00	0.50	4.10					5.00
27	12.00		0.18	0.35			68.00	0.40	4.70					6.00
28	13.00		0.20	0.35			68.00	0.50	5.80					5.00
29														
30														
31														

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

TABLE 2.1: PARTICULATE REMOVAL PROFILE (MARCH, 1986)

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1				0.40										
2	8.50		0.30	0.40			68.00	0.50	4.20					5.00
3	10.00		0.25	0.35			68.00	0.50	5.70					4.00
4	6.50		0.18	0.30			68.00	0.50	3.80					5.00
5	9.00		0.26	0.35			94.00	0.55	5.60					5.00
6	7.00		0.23	0.30			50.00	1.00	10.20					5.00
7	6.00		0.21	0.27			50.00	0.80	4.80					5.00
8	6.50		0.33	0.38			50.00	0.80	4.00					5.00
9	6.50		0.32	0.37			50.00	0.80	7.60					5.00
10	9.50		0.25	0.30			50.00	0.80	6.60					5.00
11	12.00		0.24	0.35			50.00	0.80	5.00					5.00
12	15.00		0.24	0.35			75.00	0.90	4.50					4.00
13	90.00		0.25	0.32			100.00	1.00	5.90					4.00
14	85.00		0.25	0.34			100.00	1.00	4.30					4.00
15	65.00		0.26	0.30			100.00	0.90	4.90					3.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
16	57.00		0.26	0.41			100.00	0.80	4.90					4.00
17	50.00		0.25	0.34			90.00	0.80	3.90					4.00
18	45.00		0.16	0.33			60.00	0.80	6.40					4.00
19	70.00		0.24	0.34			60.00	0.80	5.70					4.00
20	70.00		0.30	0.41			80.00	1.00	5.00					4.00
21	62.00		0.35	0.42			80.00	1.00	7.10					4.00
22	60.00		0.25	0.50			120.00	1.10	3.60					4.00
23	46.00		0.23	0.51			120.00	1.40	2.20					5.00
24	175.00		0.22	0.55			270.00	1.40	5.30					5.00
25	170.00		0.17	0.42			270.00	1.40	4.20					5.00
26	120.00		0.25	0.50			120.00	1.20	6.90					4.00
27	75.00		0.23	0.60			80.00	1.00	4.20					4.00
28	61.00		0.25	0.51			68.00	0.90	3.70					4.00
29	60.00		0.22	0.45			70.00	1.00	5.30					4.00
30	35.00		0.26	0.45			70.00	1.00	4.00					5.00
31	51.00		0.17	0.44			70.00	1.00	3.00					5.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

TABLE 2.1: PARTICULATE REMOVAL PROFILE (APRIL, 1986)

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	65.00		0.13	0.30			80.00	1.00	4.50					4.00
2	65.00		0.15	0.35	60.00	3.00	80.00	1.00	4.40	•		7.80	7.40	5.00
3	65.00		0.15	0.32			80.00	1.00	4.00					5.00
4	60.00		0.14	0.33			80.00	1.00	4.90					6.00
5	48.00		0.19	0.39			70.00	1.00	4.50					7.00
6	47.00		0.20	0.31			70.00	1.00	3.60					7.00
7	40.00		0.15	0.29			70.00	1.00	4.70					7.00
8	39.00		0.17	0.24			70.00	1.00	2.90					8.00
9	60.00		0.16	0.25			80.00	1.00	6.00					8.00
10	55.00		0.16	0.24			80.00	1.00	2.80					8.00
11	55.00		0.17	0.25			70.00	1.00	5.90					8.00
12	31.00		0.17	0.26			70.00	1.00	3.20					8.00
13	25.00		0.17	0.25			70.00	1.00	3.70					7.00
14	12.00		0.18	0.23			60.00	1.00	5.60					7.00
15	10.00		0.17	0.65			60.00	1.00	3.00					7.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

TABLE 2.1 (cont'd) APR.1986

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
16	15.00		0.14	0.55			60.00	1.00	4.90					7.00
17	12.00		0.17	0.40			60.00	1.00	2.90					8.00
18	10.00		0.15	0.35			60.00	1.00	6.40					8.00
19	9.00		0.20	0.30			60.00	1.00	3.80					8.00
20	9.00		0.17	0.26			60.00	1.00	4.00					8.00
21	15.00		0.17	0.23			60.00	1.00	4.60					8.00
22	13.00		0.17	0.23			60.00	1.00	4.20					9.00
23	15.00		0.15	0.25			60.00	1.00	3.10					8.00
24	8.00		0.16	0.24			60.00	1.00	3.70					8.00
25	6.00		0.16	0.25			60.00	1.00	4.30					8.00
26	11.00		0.20	0.32			60.00	1.00	5.40					8.00
27	10.00		0.20	0.27			60.00	1.00	3.40					9.00
28	13.00		0.18	0.30			60.00	1.00	3.50					10.00
29	8.00		0.21	0.30			60.00	1.00	5.50					10.00
30	13.00		0.17	0.25			60.00	1.00	5.20					10.00
31														

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

TABLE 2.1: PARTICULATE REMOVAL PROFILE (MAY, 1986)

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	10.00		0.15	0.24			60.00	1.00	3.30					10.00
2	10.00		0.16	0.24			60.00	1.00	5.20					10.00
3	24.00		0.21	0.25			60.00	1.00	4.40					11.00
4	16.00		0.14	0.29			60.00	1.00	3.20					11.00
5	17.00		0.17	0.26			60.00	1.00	4.80			7.90		10.00
6	12.00		0.15	0.23			60.00	0.90	4.10					11.00
7	12.00		0.15	0.23			60.00	0.90	4.50			8.10		11.00
8	12.00		0.16	0.22			60.00	0.90	3.70					11.00
9	8.00		0.15	0.24			60.00	0.90	4.00					11.00
10	8.00		0.18	0.25			60.00	0.90	4.80					13.00
11	8.00		0.17	0.28			60.00	0.90	4.90					13.00
12	3.00		0.17	0.22			60.00	0.90	5.60					13.00
13	4.00		0.17	0.37			60.00	0.90	4.30					14.00
14	3.00		0.16	0.27	6.00	1.00	60.00	0.90	3.40			8.10	7.70	14.00
15	2.00		0.15	0.28			60.00	0.90	5.10					13.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

TABLE 2.1 (cont'd)

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
16	4.00		0.19	0.23			60.00	0.90	7.70					13.00
17	2.20		0.16	0.38			60.00	0.90	7.80					13.00
18	4.30		0.19	0.39			60.00	0.90	4.10					13.00
19	3.00		0.14	0.41			60.00	0.90	10.90					14.00
20	4.50		0.22	0.65			60.00	0.80	6.60					14.00
21	3.00		0.16	0.33			60.00	0.80	6.30					13.00
22	5.50		0.17	0.26			60.00	0.80	3.90					13.00
23	4.50		0.17	0.30			60.00	0.80	5.40					13.00
24	4.70		0.21	0.28			60.00	0.80	6.00					13.00
25	3.10		0.20	0.27			60.00	0.80	4.30					14.00
26	4.00		0.20	0.30			60.00	0.80	5.80					14.00
27	4.00		0.15	0.25			60.00	0.80	4.50					15.00
28	4.00		0.16	0.22			60.00	0.80	4.00					14.00
29	3.00		0.17	0.20			60.00	0.80	5.70					14.00
30	4.00		0.18	0.20			60.00	0.80	6.90					16.00
31	2.20		0.20	0.23			60.00	0.80	3.20					15.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

TABLE 2.1: PARTICULATE REMOVAL PROFILE (JUNE, 1986)

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat	
1	3.50		0.19	0.35			60.00	0.80	6.60			8.20		18.00
2	2.00		0.14	0.22			60.00	0.80	4.90					18.00
3	2.50		0.15	0.25			60.00	0.60	5.50					16.00
4	5.00		0.18	0.23			60.00	0.60	4.50					16.00
5	3.00		0.18	0.26			60.00	0.60	3.60			8.00		16.00
6	3.50		0.20	0.26			60.00	0.60	5.40					17.00
7	4.10		0.23	0.23			60.00	0.60	3.50					17.00
8	7.20		0.16	0.25			60.00	0.60	3.10					17.00
9	3.50		0.17	0.26			60.00	0.60	4.00					18.00
10	1.50		0.12	0.24			60.00	0.60	5.30					17.00
11	4.00		0.15	0.18			60.00	0.60	1.90					19.00
12	3.00		0.18	0.20			60.00	0.60	5.70					16.00
13	3.50		0.15	0.30			60.00	0.60	9.60					17.00
14	5.20		0.18	0.23			60.00	0.80	4.70					19.00
15	2.90		0.19	0.24			60.00	0.80	4.20					19.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat	
16	3.50		0.20	0.24			60.00	0.80	4.40					19.00
17	3.50		0.12	0.23			60.00	0.60	3.50					18.00
18	5.50		0.20	0.23			60.00	0.60	6.10					18.00
19	4.50		0.18	0.23			60.00	0.60	4.60					19.00
20	6.50		0.16	0.28			60.00	0.80	6.80					19.00
21	7.00		0.22	0.21			60.00	0.80	3.60					19.00
22	3.50		0.16	0.22			60.00	0.80	4.20					19.00
23	4.50		0.17	0.25			60.00	0.80	4.80					20.00
24	5.20		0.16	0.20			60.00	0.80	4.40					20.00
25	4.50		0.17	0.20			60.00	0.80	3.80					19.00
26	4.50		0.17	0.22			60.00	0.80	4.30					20.00
27	2.50		0.18	0.24			60.00	0.80	4.30					19.00
28	4.20		0.25	0.31			60.00	0.80	4.00					19.00
29	4.30		0.26	0.36			60.00	0.80	6.40					19.00
30	2.00		0.17	0.21			60.00	0.80	4.30					20.00
31														

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

TABLE 2.1: PARTICULATE REMOVAL PROFILE (JULY, 1986)

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	4.20		0.19	0.25			60.00	0.80	4.00			8.40		20.00
2	2.50		0.17	0.24			60.00	0.80	4.10					20.00
3	2.50		0.15	0.22			60.00	0.80	4.10					20.00
4	2.50		0.17	0.22			60.00	0.60	4.80					19.00
5	2.80		0.16	0.22			60.00	0.60	3.20					20.00
6	2.90		0.19	0.24			60.00	0.60	4.40					20.00
7	2.30		0.20	0.25			60.00	0.60	5.90					21.00
8	3.50		0.18	0.28	4.50	1.00	60.00	0.60	4.10			8.40	7.90	22.00
9	2.00		0.15	0.26			60.00	0.60	4.40					22.00
10	2.00		0.22	0.22			60.00	0.60	4.00					22.00
11	2.50		0.17	0.22			60.00	0.60	3.50					22.00
12	2.90		0.25	0.22			60.00	0.60	4.30					21.00
13	2.80		0.20	0.27			60.00	0.60	4.20					20.00
14	2.30		0.18	0.23			60.00	0.60	4.20					21.00
15	2.30		0.20	0.24			60.00	0.60	3.30					21.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
16	2.50		0.15	0.24			60.00	0.70	4.00					21.00
17	4.00		0.17	0.22			60.00	0.70	4.40			8.20		22.00
18	2.80		0.18	0.22			60.00	0.70	3.40					22.00
19	3.80		0.20	0.26			60.00	0.70	3.90					22.00
20	3.90		0.20	0.25			60.00	0.70	4.50					22.00
21	2.50		0.14	0.26			60.00	0.70	5.80			8.20		25.00
22	2.00		0.18	0.23			60.00	0.70	4.50					23.00
23	2.50		0.16	0.24			60.00	0.70	4.70					22.00
24	2.50		0.17	0.23			60.00	0.70	4.70					23.00
25	3.50		0.18	0.24			60.00	0.70	5.40					25.00
26	3.00		0.18	0.30			60.00	0.70	3.20					24.00
27	1.50		0.21	0.30			60.00	0.70	4.10					23.00
28	2.00		0.18	0.24			60.00	0.70	4.50					24.00
29	4.00		0.18	0.23			60.00	0.70	3.40					24.00
30	2.50		0.18	0.26			60.00	0.70	3.80					23.00
31	3.00		0.17	0.25			60.00	0.70	4.50					23.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

TABLE 2.1: PARTICULATE REMOVAL PROFILE (AUGUST, 1986)

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	4.00		0.20	0.28			60.00	0.70	4.40					23.00
2	3.10		0.23	0.32			60.00	0.70	4.00					23.00
3	4.20		0.22	0.24			60.00	0.70	3.90					23.00
4	4.00		0.21	0.25			60.00	0.70	4.20					23.00
5	4.00		0.19	0.27			60.00	0.70	4.20			8.40		22.00
6	2.50		0.15	0.22			60.00	0.70	3.50					22.00
7	4.00		0.15	0.23			60.00	0.70	4.60					23.00
8	2.50		0.15	0.20			60.00	0.70	3.20					23.00
9	3.50		0.18	0.26			60.00	0.70	4.80					23.00
10	3.70		0.18	0.25			60.00	0.70	6.40					23.00
11	5.00		0.16	0.40			60.00	0.70	3.10			8.60		23.00
12	2.50		0.16	0.40			60.00	0.70	7.10					21.00
13	3.50		0.15	0.35			60.00	0.70	5.90					21.00
14	2.50		0.15	0.35			60.00	0.70	5.00					22.00
15	3.00		0.16	0.29			60.00	0.70	5.20					22.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
16	2.20		0.20	0.25			60.00	0.70	5.00					22.00
17	1.80		0.16	0.27			60.00	0.70	4.60					23.00
18	2.00		0.16	0.22			60.00	0.70	5.80					23.00
19	1.20		0.14	0.26			60.00	0.70	4.70					23.00
20	2.50		0.16	0.25			60.00	0.70	4.70			8.20		23.00
21	2.00		0.20	0.25			60.00	0.60	4.00					22.00
22	1.80		0.15	0.20			60.00	0.60	5.80					23.00
23	2.20		0.16	0.29			60.00	0.60	3.70					22.00
24	2.20		0.17	0.28			60.00	0.60	4.80					22.00
25	1.50		0.20	0.35			60.00	0.60	5.90					21.00
26	4.00		0.16	0.28			60.00	0.70	3.80					21.00
27	1.50		0.15	0.28			60.00	0.70	5.70					21.00
28	2.50		0.15	0.24			60.00	0.70	4.30					19.00
29	1.00		0.15	0.26			60.00	0.70	4.80					19.00
30	3.80		0.18	0.21			60.00	0.70	4.40					19.00
31	3.60		0.17	0.20			60.00	0.70	4.50					19.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

TABLE 2.1: PARTICULATE REMOVAL PROFILE (SEPTEMBER, 1986)

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	2.00		0.15	0.70			60.00	0.70	5.60			8.70		20.00
2	1.50		0.15	0.30			60.00	0.70	4.30					20.00
3	1.50		0.14	0.24			60.00	0.70	5.80					20.00
4	2.00		0.12	0.24			60.00	0.70	3.60					21.00
5	1.50		0.15	0.25			60.00	0.70	5.30					21.00
6	2.00		0.17	0.21			60.00	0.70	4.00					20.00
7	1.40		0.14	0.24			60.00	0.70	4.50					20.00
8	1.50		0.15	0.26			60.00	0.70	5.60					19.00
9	2.50		0.15	0.27			60.00	0.70	5.10					19.00
10	2.50		0.16	0.23			60.00	0.70	4.10					19.00
11	1.30		0.16	0.28			60.00	0.70	4.80					19.00
12	1.80		0.16	0.25			60.00	0.70	5.50					19.00
13	2.20		0.16	0.22			60.00	0.70	5.40					19.00
14	2.30		0.20	0.22			60.00	0.70	3.90					18.00
15	2.00		0.18	0.21			60.00	0.70	3.40					19.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

TABLE 2.1 (cont'd) SEPT.1986

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
16	0.80		0.12	0.27			60.00	0.70	3.90					18.00
17	0.80		0.14	0.21			60.00	0.70	4.40					18.00
18	2.00		0.17	0.21			60.00	0.70	2.80					17.00
19	2.50		0.15	0.21			60.00	0.70	4.10					17.00
20	2.30		0.16	0.22			60.00	0.70	2.40					17.00
21	2.10		0.17	0.24			60.00	0.70	2.60					17.00
22	2.00		0.14	0.18			60.00	0.70	4.30					18.00
23	3.70		0.14	0.18			60.00	0.70	4.00					18.00
24	2.70		0.12	0.16			60.00	0.70	4.20					19.00
25	2.20		0.14	0.17			60.00	0.70	2.70					19.00
26	2.00		0.14	0.18			60.00	0.70	4.00					20.00
27	1.40		0.18	0.22			60.00	0.70	3.60					20.00
28	1.30		0.15	0.25			60.00	0.70	4.90					20.00
29	2.50		0.15	0.22			60.00	0.70	2.60					21.00
30	0.90		0.14	0.22			60.00	0.70	4.40					20.00
31														

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

TABLE 2.1: PARTICULATE REMOVAL PROFILE (OCTOBER, 1986)

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	2.00		0.15	0.18			60.00	0.70	5.30					21.00
2	4.00		0.14	0.17			60.00	0.70	4.10					20.00
3	2.60		0.14	0.18			60.00	0.70	5.10					19.00
4	1.80		0.20	0.20			60.00	0.70	5.30					19.00
5	5.50		0.17	0.24			60.00	0.70	3.40			7.80		18.00
6	6.00		0.17	0.20			60.00	0.70	4.10					18.00
7	2.80		0.15	0.20			60.00	0.70	4.60					17.00
8	7.00		0.16	0.20	23.00	1.50	60.00	0.70	4.80					17.00
9	5.00		0.16	0.20			60.00	1.00	4.50					17.00
10	5.00		0.18	0.23			60.00	1.00	5.30					16.00
11	4.50		0.20	0.25			60.00	1.00	5.30					16.00
12	4.80		0.21	0.30			60.00	1.00	6.10					16.00
13	8.00		0.17	0.22			60.00	1.00	5.50					16.00
14	8.00		0.18	0.22			60.00	1.00	1.20					16.00
15	5.00		0.17	0.25			60.00	1.00	6.00					16.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

TABLE 2.1 (cont'd) OCT.1986

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
16	8.00		0.17	0.25			60.00	1.00	5.60					15.00
17	7.50		0.16	0.45			60.00	0.80	7.90					14.00
18	6.50		0.23	0.41			60.00	0.80	6.20					14.00
19	6.00		0.21	0.34			60.00	0.80	6.50					14.00
20	9.00		0.17	0.40			60.00	0.80	6.10					14.00
21	8.50		0.18	0.35			60.00	0.80	2.70					14.00
22	8.50		0.18	0.30			60.00	0.80	6.00					14.00
23	7.00		0.17	0.26			60.00	0.80	4.90					14.00
24	5.00		0.15	0.26			60.00	0.80	7.60					14.00
25	8.50		0.25	0.27			60.00	0.80	4.00					14.00
26	8.50		0.23	0.24			60.00	0.80	6.00					14.00
27	6.00		0.18	0.25			60.00	0.80	7.50					14.00
28	7.50		0.15	0.25			60.00	0.80	5.00					15.00
29	7.00		0.17	0.24			60.00	0.80	6.30					15.00
30	7.50		0.16	0.27			60.00	0.80	4.50					15.00
31	5.00		0.15	0.24			60.00	0.80	5.20					14.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	4.50		0.16	0.25			60.00	0.80	4.60					14.00
2	4.80		0.22	0.27			60.00	0.80	3.60					14.00
3	5.00		0.17	0.25			60.00	0.80	4.50					13.00
4	6.50		0.17	0.22			60.00	0.70	4.30					13.00
5	10.00		0.16	0.22	15.50	3.00	60.00	0.70	3.30					13.00
6	9.00		0.17	0.23			60.00	0.70	5.40					12.00
7	8.50		0.13	0.20			60.00	0.70	4.80					13.00
8	5.00		0.20	0.22			60.00	0.70	3.80					12.00
9	8.80		0.19	0.24			60.00	0.70	4.20					12.00
10	9.50		0.13	0.23			60.00	0.70	5.70					13.00
11	10.00		0.15	0.21			60.00	0.70	4.20					12.00
12	12.00		0.15	0.22			60.00	0.70	4.40					12.00
13	14.00		0.16	0.25			60.00	0.70	4.50					11.00
14	21.00		0.16	0.18			60.00	0.70	4.80					11.00
15	23.00		0.18	0.22			60.00	0.80	5.60					8.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

TABLE 2.1 (cont'd) NOV.1986

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
16	24.00		0.18	0.24			60.00	0.80	3.70					8.00
17	26.00		0.18	0.20			60.00	0.80	5.90					9.00
18	32.00		0.20	0.23			60.00	1.00	4.50					8.00
19	30.00		0.20	0.65			60.00	1.00	4.00					8.00
20	22.00		0.22	0.35			60.00	1.00	4.40					9.00
21	18.00		0.18	0.40			60.00	1.00	4.70					8.00
22	16.00		0.19	0.40			60.00	1.00	3.90					8.00
23	12.00		0.20	0.40			60.00	1.00	4.10					8.00
24	10.00		0.18	0.30			60.00	0.70	5.90					8.00
25	10.00		0.18	0.30			60.00	0.70	4.00					7.00
26	18.00		0.18	0.35			60.00	0.70	3.80					8.00
27	17.00		0.17	0.33			60.00	0.70	4.20					8.00
28	13.00		0.18	0.35			60.00	0.80	5.70					8.00
29	17.00		0.20	0.40			60.00	0.80	4.10					9.00
30	17.00		0.16	0.35			60.00	0.80	3.40					9.00
31														

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
1	13.00		0.16	0.24			60.00	0.80	4.70					8.00
2	12.00		0.15	0.27			60.00	0.80	5.70					7.00
3	11.00		0.15	0.32	10.00	1.50	60.00	0.80	3.80					8.00
4	17.00		0.17	0.33			60.00	0.80	4.30					8.00
5	22.00		0.18	0.28			60.00	0.80	4.80					7.00
6	35.00		0.19	0.26			60.00	0.80	4.00					6.00
7	30.00		0.19	0.25			60.00	0.80	4.40					6.00
8	38.00		0.18	0.30			60.00	0.80	5.50					7.00
9	60.00		0.20	0.28			70.00	1.00	8.20					7.00
10	45.00		0.17	0.29			70.00	1.00	4.10					6.00
11	40.00		0.18	0.26			70.00	1.00	4.10					6.00
12	45.00		0.20	0.25			70.00	1.00	5.90					5.00
13	38.00		0.21	0.28			70.00	1.00	3.70					5.00
14	32.00		0.22	0.28			70.00	1.00	3.30					5.00
15	35.00		0.21	0.28			60.00	1.00	4.90					5.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

DATE	TURBIDITY (FTU)				COLOUR (TCU)		COAGULANT (ALUM)	COAG. AID	PAC	METAL RES. Al (mg/L)		pH		TEMP. (DEG.C)
	Raw	Set.	Filter	Treat.	Raw	Treat.	mg/L	mg/L	mg/L	Raw	Treat.	Raw	Treat.	
16	24.00		0.22	0.26			60.00	0.80	3.00					5.00
17	22.00		0.20	0.28			60.00	0.80	4.50					6.00
18	21.00		0.19	0.24			60.00	0.80	3.80					7.00
19	15.00		0.18	0.28			60.00	0.80	6.00					6.00
20	11.00		0.17	0.35			60.00	0.80	3.60					6.00
21	7.00		0.20	0.30			60.00	0.80	4.10					6.00
22	11.00		0.22	0.35			60.00	0.80	5.80					5.00
23	8.00		0.16	0.25			60.00	0.80	3.80					5.00
24	15.00		0.18	0.25			60.00	0.80	6.60					5.00
25	11.00		0.20	0.20			60.00	0.80	2.50					6.00
26	10.00		0.20	0.24			60.00	0.80	3.00					6.00
27	14.00		0.20	0.27			60.00	0.80	4.70					5.00
28	12.00		0.19	0.24			60.00	0.80	4.20					5.00
29	12.00		0.20	0.23			60.00	0.80	4.90					5.00
30	20.00		0.17	0.23			60.00	0.80	3.10					5.00
31	23.00		0.19	0.24			60.00	0.90	4.80					5.00

Source: WTP Utility Monitoring Records, Sheets B1, B3, B4-C4, B5-C5

Note: Prime coagulant and coagulant aid dosages are calculated from metering pump settings.

TABLE 3.0: DISINFECTION SUMMARY

MONTH	CHEMICAL	1986 PRE-CHLORINATION Max.	1986 PRE-CHLORINATION Min.	1986 PRE-CHLORINATION Avg.	1986 POST-CHLORINATION Max.	1986 POST-CHLORINATION Min.	1986 POST-CHLORINATION Avg.	1985 PRE-CHLORINATION Max.	1985 PRE-CHLORINATION Min.	1985 PRE-CHLORINATION Avg.	1985 POST-CHLORINATION Max.	1985 POST-CHLORINATION Min.	1985 POST-CHLORINATION Avg.	1984 PRE-CHLORINATION Max.	1984 PRE-CHLORINATION Min.	1984 PRE-CHLORINATION Avg.	1984 POST-CHLORINATION Max.	1984 POST-CHLORINATION Min.	1984 POST-CHLORINATION Avg.
JAN	Cl2 Demand						3.30			<<(NO DATA)>>									
	Cl2 Dosage						4.10			<<(NO DATA)>>									
	NH3																		
	SO2																		
	Cl2 Resid. Free									<<(NO DATA)>>									
	Cl2 Resid. Comb.									<<(NO DATA)>>									
	Cl2 Resid. Total	<<<<(NO DATA)>>>>			1.10	0.50	0.84	<<<<(NO DATA)>>>>			1.10	0.50	0.82	<<<<(NO DATA)>>>>			0.90	0.50	0.72
	F- Dosage																		
	F- Res.							0.16	0.16	0.16	0.10	0.10	0.10						
FEB	Cl2 Demand						1.90			<<(NO DATA)>>									
	Cl2 Dosage						2.70			<<(NO DATA)>>									
	NH3																		
	SO2																		
	Cl2 Resid. Free									<<(NO DATA)>>									
	Cl2 Resid. Comb.									<<(NO DATA)>>									
	Cl2 Resid. Total	<<<<(NO DATA)>>>>			1.00	0.50	0.86	<<<<(NO DATA)>>>>			1.10	0.90	0.99	<<<<(NO DATA)>>>>			1.10	0.50	0.84
	F- Dosage																		
	F- Res.							0.15	0.15	0.15	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
MAR	Cl2 Demand						1.10			<<(NO DATA)>>									
	Cl2 Dosage						2.00			<<(NO DATA)>>									
	NH3																		
	SO2																		
	Cl2 Resid. Free									<<(NO DATA)>>									
	Cl2 Resid. Comb.									<<(NO DATA)>>									
	Cl2 Resid. Total	<<<<(NO DATA)>>>>			1.20	0.60	0.89	<<<<(NO DATA)>>>>			1.10	0.70	0.91	<<<<(NO DATA)>>>>			1.50	0.60	0.95
	F- Dosage																		
	F- Res.													0.10	0.10	0.10	0.10	0.10	0.10

NOTE: 1. Cl2 weighed once per month. Daily chlorine dosage cannot be measured reliably.
Validity of reported chlorine dosages is questionable.
2. Only total Cl2 residual measured.
3. No Prechlorination at WTP
4. NH3 and SO2 are not used
5. No Fluoride addition at plant; monitored "F- Residuals" are background concentrations in raw water supply.

SOURCE: WTP Utility Monitoring Records, Sheet B2

MITCHELL'S BAY

TABLE 3.0 (cont'd)

MONTH	CHEMICAL	1986						1985						1984					
		PRE-CHLORINATION			POST-CHLORINATION			PRE-CHLORINATION			POST-CHLORINATION			PRE-CHLORINATION			POST-CHLORINATION		
		Max.	Min.	Avg.	Max.	Min.	Avg.	Max.	Min.	Avg.	Max.	Min.	Avg.	Max.	Min.	Avg.	Max.	Min.	Avg.
APR	Cl2 Demand									<<(NO DATA)>>									
	Cl2 Dosage									<<(NO DATA)>>									
	NH3																		
	SO2																		
	Cl2 Resid. Free									<<(NO DATA)>>									
	Cl2 Resid. Comb.									<<(NO DATA)>>									
	Cl2 Resid. Total	<<<<(NO DATA)>>>>			1.20	0.70	0.93	<<<(NO DATA)>>>>>			1.10	0.80	0.97	<<<(NO DATA)>>>>>			1.30	0.80	0.92
	F- Dosage																		
	F- Res.	0.14	0.14	0.14	0.07	0.07	0.07	0.10	0.10	0.10	0.10	0.10	0.10	0.13	0.13	0.13	0.10	0.10	0.10
MAY	Cl2 Demand									<<(NO DATA)>>									
	Cl2 Dosage									<<(NO DATA)>>									
	NH3																		
	SO2																		
	Cl2 Resid. Free									<<(NO DATA)>>									
	Cl2 Resid. Comb.									<<(NO DATA)>>									
	Cl2 Resid. Total	<<<<(NO DATA)>>>>			1.70	0.80	1.12	<<<(NO DATA)>>>>>			1.40	0.90	1.05	<<<(NO DATA)>>>>>			1.10	0.70	0.93
	F- Dosage																		
	F- Res.	0.11	0.11	0.11	0.06	0.06	0.06	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10			
JUN	Cl2 Demand									<<(NO DATA)>>									
	Cl2 Dosage									<<(NO DATA)>>									
	NH3																		
	SO2																		
	Cl2 Resid. Free									<<(NO DATA)>>									
	Cl2 Resid. Comb.									<<(NO DATA)>>									
	Cl2 Resid. Total	<<<<(NO DATA)>>>>			1.20	0.70	0.96	<<<(NO DATA)>>>>>			1.30	0.50	1.00	<<<(NO DATA)>>>>>			1.50	0.70	0.96
	F- Dosage																		
	F- Res.													0.11	0.11	0.11	0.10	0.10	0.10

NOTE: 1. Cl2 weighed once per month. Daily chlorine dosage cannot be measured reliably.
Validity of reported chlorine dosages is questionable.
2. Only total Cl2 residual measured.
3. No Prechlorination at WTP
4. NH3 and SO2 are not used
5. No Fluoride addition at plant; monitored "F- Residuals" are background concentrations in raw water supply.

SOURCE: WTP Utility Monitoring Records, Sheet B2

MITCHELL'S BAY

TABLE 3.0 (cont'd)

MONTH	CHEMICAL	1986						1985						1984					
		PRE-CHLORINATION			POST-CHLORINATION			PRE-CHLORINATION			POST-CHLORINATION			PRE-CHLORINATION			POST-CHLORINATION		
		Max.	Min.	Avg.	Max.	Min.	Avg.	Max.	Min.	Avg.	Max.	Min.	Avg.	Max.	Min.	Avg.	Max.	Min.	Avg.
JUL	Cl2 Demand									<<(NO DATA)>>									
	Cl2 Dosage									<<(NO DATA)>>									
	NH3																		
	SO2																		
	Cl2 Resid. Free									<<(NO DATA)>>									
	Cl2 Resid. Comb.									<<(NO DATA)>>									
	Cl2 Resid. Total	<<<<(NO DATA)>>>>			1.30	0.70	0.98	<<<<(NO DATA)>>>>			1.10	0.70	0.93	<<<<(NO DATA)>>>>			1.20	0.70	0.90
	F- Dosage																		
	F- Res.	0.11	0.11	0.11	0.06	0.06	0.06	0.14	0.14	0.14				0.12	0.12	0.12	0.10	0.10	0.10
AUG	Cl2 Demand									<<(NO DATA)>>									
	Cl2 Dosage									<<(NO DATA)>>									
	NH3																		
	SO2																		
	Cl2 Resid. Free									<<(NO DATA)>>									
	Cl2 Resid. Comb.									<<(NO DATA)>>									
	Cl2 Resid. Total	<<<<(NO DATA)>>>>			1.50	0.80	1.11	<<<<(NO DATA)>>>>			1.20	0.80	0.95	<<<<(NO DATA)>>>>			1.10	0.70	0.92
	F- Dosage																		
	F- Res.							0.11	0.11	0.11	0.09	0.09	0.09	0.11	0.11	0.11	0.10	0.10	0.10
SEP	Cl2 Demand									<<(NO DATA)>>									
	Cl2 Dosage									<<(NO DATA)>>									
	NH3																		
	SO2																		
	Cl2 Resid. Free									<<(NO DATA)>>									
	Cl2 Resid. Comb.									<<(NO DATA)>>									
	Cl2 Resid. Total	<<<<(NO DATA)>>>>			1.20	0.80	0.98	<<<<(NO DATA)>>>>			1.20	0.60	0.88	<<<<(NO DATA)>>>>			1.40	0.80	0.98
	F- Dosage																		
	F- Res.							0.10	0.10	0.10	0.07	0.07	0.07						

NOTE: 1. Cl2 weighed once per month. Daily chlorine dosage cannot be measured reliably.
Validity of reported chlorine dosages is questionable.
2. Only total Cl2 residual measured.
3. No Prechlorination at WTP
4. NH3 and SO2 are not used
5. No Fluoride addition at plant; monitored "F- Residuals" are background concentrations in raw water supply.

SOURCE: WTP Utility Monitoring Records, Sheet B2

MITCHELL'S BAY

TABLE 3.0 (cont'd)

MONTH	CHEMICAL	1986						1985						1984					
		PRE-CHLORINATION			POST-CHLORINATION			PRE-CHLORINATION			POST-CHLORINATION			PRE-CHLORINATION			POST-CHLORINATION		
		Max.	Min.	Avg.	Max.	Min.	Avg.	Max.	Min.	Avg.	Max.	Min.	Avg.	Max.	Min.	Avg.	Max.	Min.	Avg.
OCT	Cl2 Demand									<<(NO DATA)>>									
	Cl2 Dosage									<<(NO DATA)>>									
	NH3																		
	SO2																		
	Cl2 Resid. Free									<<(NO DATA)>>									
	Cl2 Resid. Comb.									<<(NO DATA)>>									
	Cl2 Resid. Total	<<<<(NO DATA)>>>>			1.20	0.70	0.93	<<<<(NO DATA)>>>>			1.30	0.70	0.99	<<<<(NO DATA)>>>>			1.00	0.70	0.88
	F- Dosage																		
	F- Res.													0.10	0.10	0.10	0.10	0.10	0.10
NOV	Cl2 Demand									<<(NO DATA)>>									
	Cl2 Dosage									<<(NO DATA)>>									
	NH3																		
	SO2																		
	Cl2 Resid. Free									<<(NO DATA)>>									
	Cl2 Resid. Comb.									<<(NO DATA)>>									
	Cl2 Resid. Total	<<<<(NO DATA)>>>>			1.30	0.60	0.99	<<<<(NO DATA)>>>>			1.20	0.50	0.88	<<<<(NO DATA)>>>>			1.10	0.60	0.89
	F- Dosage																		
	F- Res.	0.12	0.12	0.12	0.10	0.10	0.10	0.14	0.14	0.14	0.07	0.07	0.07	0.10	0.10	0.10	0.10	0.10	0.10
DEC	Cl2 Demand									<<(NO DATA)>>									
	Cl2 Dosage									<<(NO DATA)>>									
	NH3																		
	SO2																		
	Cl2 Resid. Free									<<(NO DATA)>>									
	Cl2 Resid. Comb.									<<(NO DATA)>>									
	Cl2 Resid. Total	<<<<(NO DATA)>>>>			1.10	0.70	0.90	<<<<(NO DATA)>>>>			1.20	0.60	0.92	<<<<(NO DATA)>>>>			1.00	0.70	0.87
	F- Dosage																		
	F- Res.	0.10	0.10	0.10	0.10	0.10	0.10	0.19	0.19	0.19	0.08	0.08	0.08	0.11	0.11	0.11			

NOTE: 1. Cl2 weighed once per month. Daily chlorine dosage cannot be measured reliably.
Validity of reported chlorine dosages is questionable.
2. Only total Cl2 residual measured.
3. No Prechlorination at WTP
4. NH3 and SO2 are not used
5. No Fluoride addition at plant; monitored "F- Residuals" are background concentrations in raw water supply.

SOURCE: WTP Utility Monitoring Records, Sheet B2

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	Residual Cl_2			Cl_2		NH_3	SO_2	Residual Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														0.90		
2														0.80		
3														1.20		
4														1.10		
5														1.00		
6														0.80		
7														1.00		
8														1.00		
9														0.80		
10														0.80		
11														1.10		
12														1.00		0.10
13														0.90		
14														1.00		
15														1.00		
16														1.10		
17														0.90		
18														0.90		
19														0.90		
20														0.90		
21														0.90		
22														0.90		
23														0.80		
24														1.00		
25														1.00		
26														1.00		
27														1.10		
28														1.00		
29														0.80		
30														0.90		
31														1.00		

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3. No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

TABLE 3.2: DISINFECTION PROFILE (FEBRUARY, 1983)

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														1.00		0.10
2														1.00		
3														0.90		
4														1.00		
5														0.90		
6														0.90		
7														0.90		
8														0.90		
9														0.90		
10														0.90		
11														0.90		
12														0.80		
13														0.80		
14														0.80		
15														0.70		
16														0.80		
17														0.80		
18														0.80		
19														0.70		
20														0.80		
21														0.80		
22														0.90		
23														0.90		
24														1.00		
25														1.00		
26														1.00		
27														1.00		
28														1.00		
29																
30																
31																

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis. Cl_2 used measured once per month. Only total Cl_2 residual is measured.
3. No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														0.90		
2														0.90		
3														0.90		
4														0.90		
5														0.80		
6														0.80		
7														0.70		
8														0.70		
9														0.80		
10														0.70		
11														0.70		
12														0.70		
13														0.80		
14														0.90		
15														0.90		
16														1.00		
17														0.90		
18														1.10		
19														1.10		
20														0.90		
21														0.80		
22														0.70		
23														0.80		
24														0.70		
25														0.70		
26														0.70		
27														0.70		
28														0.80		
29														0.80		
30														1.00		
31														0.90		

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3. No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

TABLE 3.2: DISINFECTION PROFILE (APRIL, 1983)

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														0.80		
2														0.80		
3														0.90		
4														0.90		
5														0.80		
6														0.80		0.10
7														0.90		
8														1.00		
9														0.90		
10														0.90		
11														0.80		
12														0.70		
13														0.70		
14														0.70		
15														0.60		
16														0.60		
17														0.60		
18														0.60		
19														0.50		
20														0.70		
21														0.70		
22														0.80		
23														0.80		
24														0.70		
25														1.00		
26														0.80		
27														0.70		
28														0.60		
29														0.70		
30														0.70		
31																

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3. No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														0.60		
2														0.90		
3														0.80		
4														0.80		
5														0.90		
6														0.80		
7														0.70		
8														0.80		
9														0.70		
10														0.60		
11														0.70		0.04
12														0.70		
13														0.70		
14														0.70		
15														0.70		
16														0.70		
17														0.60		
18														0.70		
19														0.70		
20														0.70		
21														0.90		
22														0.90		
23														0.90		
24														1.00		
25														0.80		
26														0.80		
27														0.70		
28														0.70		
29														0.80		
30														0.80		
31														0.70		

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis. Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3. No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														0.70		
2														0.80		
3														0.70		
4														0.70		
5														0.70		
6														0.70		
7														0.60		
8														0.60		0.11
9														0.70		
10														0.70		
11														0.70		
12														0.70		
13														1.10		
14														1.10		
15														1.30		
16														1.00		
17														0.50		
18														0.50		
19														0.70		
20														0.70		
21														0.60		
22														0.80		
23														0.80		
24														0.40		
25														0.70		
26														0.80		
27														0.90		
28														0.90		
29														0.80		
30														0.80		
31																

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3 No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														0.90		
2														0.70		
3														0.60		
4														1.50		
5														1.20		
6														0.60		0.10
7														1.00		
8														0.90		
9														1.00		
10														0.90		
11														0.90		
12														0.90		
13														0.60		
14														0.70		
15														0.70		
16														0.70		
17														0.80		
18														0.80		
19														0.80		
20														0.80		
21														0.80		
22														0.80		
23														0.80		
24														0.80		
25														0.90		
26														0.90		
27														1.40		
28														0.90		
29														1.00		
30														0.90		
31														0.90		

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3. No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

TABLE 3.2: DISINFECTION PROFILE (AUGUST, 1983)

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														0.80		
2														0.90		
3														0.90		
4														0.90		
5														0.80		
6														0.70		
7														0.70		
8														0.80		
9														0.70		
10														0.70		0.10
11														0.70		
12														0.60		
13														0.60		
14														0.90		
15														0.80		
16														0.60		
17														0.70		
18														0.80		
19														1.00		
20														0.60		
21														0.70		
22														0.80		
23														0.60		
24														0.80		
25														0.80		
26														0.60		
27														0.90		
28														0.70		
29														0.90		
30														0.80		
31														0.70		

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3. No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														0.70		
2														0.80		
3														0.60		
4														0.90		
5														1.40		
6														1.00		
7														0.90		0.10
8														0.90		
9														0.80		
10														0.80		
11														0.90		
12														0.80		
13														0.70		
14														0.60		
15														0.60		
16														0.80		
17														0.90		
18														0.80		
19														0.80		
20														1.00		
21														0.70		
22														0.70		
23														0.90		
24														0.90		
25														0.70		
26														0.70		
27														0.70		
28														0.80		
29														0.80		
30														0.70		
31																

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3 No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														0.70		
2														0.70		
3														0.70		
4														0.80		
5														0.70		0.10
6														0.60		
7														0.70		
8														0.70		
9														0.80		
10														0.80		
11														0.60		
12														0.90		
13														0.80		
14														0.80		
15														0.70		
16														0.60		
17														0.90		
18														0.70		
19														0.70		
20														0.80		
21														0.80		
22														0.80		
23														0.90		
24														0.90		
25														0.90		
26														0.90		
27														0.80		
28														0.80		
29														0.80		
30														1.00		
31														0.90		

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3 No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														0.90		
2														0.90		
3														0.80		
4														0.80		
5														0.80		
6														0.80		
7														0.70		
8														0.80		
9														0.70		
10														0.80		
11														0.90		
12														0.90		
13														0.80		
14														0.80		
15														0.80		
16														0.70		0.10
17														0.80		
18														0.80		
19														0.70		
20														0.80		
21														0.80		
22														0.70		
23														0.70		
24														0.70		
25														0.70		
26														0.70		
27														0.40		
28														0.90		
29														0.90		
30														0.70		
31																

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3 No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

TABLE 3.2: DISINFECTION PROFILE (DECEMBER, 1983)

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														0.70		
2														0.70		
3														0.70		
4														0.70		
5														0.70		
6														0.80		
7														0.70		0.10
8														0.70		
9														0.80		
10														0.80		
11														0.80		
12														0.80		
13														0.70		
14														0.80		
15														0.60		
16														0.80		
17														0.90		
18														0.80		
19														0.80		
20														0.80		
21														0.80		
22														0.70		
23														0.60		
24														0.60		
25														0.70		
26														0.60		
27														0.70		
28														0.60		
29														0.60		
30														0.60		
31														0.70		

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3. No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														0.60		
2														0.70		
3														0.50		
4														0.60		
5														0.50		
6														0.70		
7														0.60		
8														0.70		
9														0.80		
10														0.90		
11														0.70		
12														0.80		
13														0.80		
14														0.80		
15														0.80		
16														0.80		
17														0.70		
18														0.80		
19														0.80		
20														0.80		
21														0.90		
22														0.80		
23														0.80		
24														0.70		
25														0.60		
26														0.70		
27														0.60		
28														0.60		
29														0.70		
30														0.70		
31														0.80		

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3 No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														0.90		0.10
2														0.90		
3														0.90		
4														0.70		
5														0.80		
6														0.70		
7														0.80		
8														0.90		
9														0.80		
10														0.70		
11														0.80		
12														0.70		
13														0.70		
14														0.60		
15														0.80		
16														0.80		
17														0.70		
18														0.70		
19														0.50		
20														0.90		
21														1.10		
22														1.00		
23														0.80		
24														1.00		
25														1.00		
26														1.00		
27														1.00		
28														1.10		
29														1.00		
30																
31																

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3 No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														1.00		
2														1.20		
3														1.50		
4														1.20		
5														0.70		
6														0.70		
7														0.90		0.10
8														0.90		
9														1.00		
10														0.90		
11														0.90		
12														1.00		
13														1.00		
14														1.00		
15														0.90		
16														0.90		
17														1.00		
18														1.00		
19														1.00		
20														0.90		
21														0.80		
22														0.60		
23														0.90		
24														1.00		
25														0.70		
26														1.00		
27														0.90		
28														0.90		
29														0.90		
30														1.00		
31														1.10		

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3 No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														0.90		
2														0.90		
3														1.00		
4														0.90		0.10
5														1.00		
6														1.10		
7														1.30		
8														1.00		
9														0.80		
10														0.90		
11														0.90		
12														1.00		
13														0.90		
14														0.90		
15														0.80		
16														0.80		
17														1.00		
18														0.90		
19														0.80		
20														0.90		
21														0.90		
22														0.90		
23														0.90		
24														0.90		
25														1.00		
26														0.90		
27														0.90		
28														0.80		
29														0.80		
30														0.80		
31																

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3. No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														0.80		
2														0.90		
3														1.00		
4														1.10		
5														1.00		
6														0.90		
7														0.80		
8														0.80		
9														0.90		
10														0.90		
11														0.90		
12														0.90		
13														0.80		
14														0.90		
15														1.00		
16														1.10		
17														0.90		
18														0.80		
19														1.00		
20														0.90		
21														1.10		
22														1.10		
23														1.10		
24														0.90		
25														0.90		
26														0.80		
27														1.00		
28														1.00		
29														0.90		
30														0.90		
31														0.70		

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3 No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														0.70		
2														0.80		
3														1.50		
4														1.10		
5														1.00		
6														0.80		0.10
7														0.70		
8														0.80		
9														1.00		
10														1.10		
11														0.80		
12														1.00		
13														1.00		
14														0.80		
15														1.10		
16														1.10		
17														1.20		
18														1.20		
19														1.20		
20														0.90		
21														0.70		
22														1.00		
23														0.80		
24														0.90		
25														1.00		
26														0.90		
27														1.10		
28														0.90		
29														0.90		
30														0.90		
31																

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3 No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														1.00		
2														0.90		
3														0.90		
4														0.80		
5														0.70		
6														0.80		
7														0.70		
8														0.80		
9														0.90		
10														1.00		0.10
11														0.90		
12														0.90		
13														0.90		
14														0.70		
15														0.90		
16														1.20		
17														0.80		
18														0.70		
19														0.90		
20														1.20		
21														0.90		
22														1.00		
23														0.90		
24														0.90		
25														0.80		
26														0.90		
27														0.90		
28														0.90		
29														1.00		
30														1.10		
31														0.90		

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3 No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														0.90		
2														0.90		
3														0.80		
4														0.90		
5														0.70		
6														0.90		
7														0.90		
8														1.00		0.10
9														0.90		
10														0.80		
11														0.70		
12														0.80		
13														1.00		
14														0.90		
15														0.90		
16														1.00		
17														0.90		
18														1.00		
19														0.80		
20														1.00		
21														1.00		
22														1.10		
23														0.90		
24														0.90		
25														0.90		
26														1.00		
27														1.00		
28														1.00		
29														1.00		
30														1.00		
31														1.00		

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3 No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														0.80		
2														0.90		
3														1.10		
4														0.90		
5														0.90		
6														0.90		
7														1.00		
8														1.20		
9														1.40		
10														1.30		
11														1.20		
12														1.20		
13														1.00		
14														1.10		
15														1.10		
16														0.90		
17														0.90		
18														1.00		
19														1.00		
20														1.00		
21														1.00		
22														1.00		
23														1.00		
24														0.80		
25														0.80		
26														0.90		
27														0.80		
28														0.80		
29														0.80		
30														0.80		
31																

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3 No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														0.70		
2														0.90		
3														0.90		
4														0.90		
5														0.90		
6														0.80		
7														0.90		
8														0.90		
9														0.80		
10														0.90		0.10
11														0.90		
12														0.80		
13														1.00		
14														0.90		
15														0.80		
16														1.00		
17														1.00		
18														0.90		
19														0.80		
20														0.80		
21														0.90		
22														0.90		
23														1.00		
24														0.80		
25														0.80		
26														0.90		
27														0.90		
28														0.90		
29														0.90		
30														0.90		
31														0.90		

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3 No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														0.90		
2														0.90		
3														0.90		
4														1.00		
5														0.90		
6														1.00		
7														1.00		
8														1.00		
9														1.00		
10														1.00		
11														1.00		
12														0.90		
13														0.80		
14														0.90		0.10
15														0.80		
16														0.90		
17														0.90		
18														0.80		
19														0.60		
20														0.70		
21														0.70		
22														0.70		
23														0.80		
24														0.90		
25														0.90		
26														1.10		
27														1.00		
28														1.00		
29														1.00		
30														0.80		
31																

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3 No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														1.00		
2														0.70		
3														0.80		
4														0.80		
5														0.90		
6														1.00		
7														1.00		
8														1.00		
9														0.90		
10														1.00		
11														0.90		
12														0.80		
13														0.70		
14														0.90		
15														0.80		
16														0.80		
17														1.00		
18														0.90		
19														0.90		
20														0.90		
21														0.90		
22														0.90		
23														0.90		
24														0.90		
25														0.90		
26														0.90		
27														0.90		
28														0.80		
29														0.70		
30														0.70		
31														0.90		

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3 No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														0.90		
2														1.00		
3														1.10		
4														1.00		
5														0.90		
6														0.80		
7														0.80		
8														0.90		
9														1.00		
10														0.90		
11														1.00		
12														0.90		
13														0.90		
14														0.80		
15														0.90		
16														0.90		0.10
17														0.60		
18														0.80		
19														0.80		
20														0.60		
21														0.50		
22														1.00		
23														0.80		
24														0.80		
25														0.70		
26														0.70		
27														0.70		
28														0.50		
29														0.70		
30														0.70		
31														0.70		

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3 No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														0.90		
2														1.00		
3														0.90		
4														0.90		
5														0.90		
6														1.00		0.10
7														0.90		
8														1.00		
9														1.00		
10														1.00		
11														1.00		
12														1.00		
13														1.10		
14														1.00		
15														1.00		
16														1.00		
17														1.00		
18														1.00		
19														1.00		
20														1.00		
21														1.00		
22														1.00		
23														1.00		
24														1.00		
25														1.00		
26														1.10		
27														1.00		
28														0.90		
29																
30																
31																

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3 No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														0.70		
2														0.70		
3														0.70		
4														0.80		
5														1.00		
6														1.00		
7														0.90		
8														0.90		
9														0.90		
10														0.90		
11														0.80		
12														0.80		
13														0.90		
14														0.80		
15														0.90		
16														1.00		
17														1.00		
18														1.00		
19														1.00		
20														1.10		
21														1.00		
22														1.00		
23														1.00		
24														0.90		
25														0.90		
26														0.90		
27														0.90		
28														0.90		
29														1.00		
30														1.00		
31														1.00		

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3 No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														1.10		
2														1.00		
3														1.00		0.10
4														1.00		
5														1.00		
6														1.00		
7														1.00		
8														1.00		
9														0.90		
10														0.90		
11														0.90		
12														1.00		
13														1.00		
14														0.90		
15														0.90		
16														1.00		
17														0.90		
18														0.80		
19														0.90		
20														1.00		
21														0.90		
22														1.10		
23														1.00		
24														1.00		
25														0.90		
26														1.00		
27														1.00		
28														1.00		
29														0.90		
30														1.00		
31																

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3 No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														1.10		
2														1.10		
3														1.10		
4														1.00		
5														1.00		
6														1.00		
7														1.00		
8														1.10		0.10
9														1.10		
10														1.10		
11														1.00		
12														1.00		
13														1.00		
14														1.00		
15														1.00		
16														1.00		
17														1.20		
18														1.20		
19														1.20		
20														1.10		
21														1.40		
22														1.20		
23														1.00		
24														1.00		
25														0.90		
26														0.90		
27														1.10		
28														1.00		
29														1.00		
30														0.90		
31														1.00		

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3 No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														1.10		
2														1.10		
3														1.10		
4														1.00		
5														1.20		
6														1.10		
7														1.00		
8														0.50		
9														1.20		
10														1.30		
11														1.20		
12														1.00		
13														0.90		
14														0.90		
15														0.90		
16														0.90		
17														1.00		
18														1.00		
19														0.90		
20														0.80		
21														0.90		
22														1.10		
23														1.00		
24														0.90		
25														1.20		
26														1.10		
27														1.00		
28														0.80		
29														0.80		
30														1.10		
31																

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3 No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														0.90		
2														1.10		
3														1.00		
4														1.00		
5														1.00		
6														0.70		
7														1.00		
8														1.10		
9														1.00		
10														1.10		
11														0.80		
12														0.80		
13														0.70		
14														0.80		
15														1.00		
16														0.80		
17														0.90		
18														1.00		
19														0.90		
20														0.90		
21														1.00		
22														1.00		
23														0.80		
24														0.90		
25														1.00		
26														1.00		
27														0.90		
28														1.00		
29														1.00		
30														0.90		
31														0.80		

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3. No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														0.90		
2														0.80		
3														0.80		
4														0.90		
5														1.00		
6														1.20		
7														1.00		
8														1.00		
9														1.10		
10														0.90		
11														0.90		
12														1.20		
13														0.90		
14														0.90		
15														0.90		
16														0.90		
17														0.80		
18														0.80		
19														0.90		
20														0.90		
21														0.80		
22														0.90		0.09
23														1.00		
24														1.00		
25														0.90		
26														1.00		
27														1.00		
28														1.00		
29														1.20		
30														1.00		
31														0.90		

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3 No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														0.90		
2														0.80		
3														1.00		
4														1.00		
5														1.10		
6														1.00		
7														0.90		
8														0.70		
9														1.10		
10														0.90		
11														0.70		
12														0.70		
13														0.90		
14														0.80		
15														0.60		
16														0.70		
17														0.70		
18														0.70		
19														0.60		
20														1.20		
21														0.90		
22														1.00		
23														1.20		
24														1.20		
25														0.80		
26														0.70		0.07
27														0.60		
28														1.00		
29														0.90		
30														1.00		
31																

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3 No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														1.10		
2														0.90		
3														0.90		
4														0.80		
5														1.00		
6														0.90		
7														1.00		
8														1.00		
9														0.90		
10														0.80		
11														0.70		
12														1.00		
13														1.00		
14														1.00		
15														1.00		
16														1.20		
17														1.20		
18														1.10		
19														1.30		
20														1.20		
21														1.20		
22														1.10		
23														1.00		
24														1.00		
25														0.90		
26														0.90		
27														0.90		
28														1.00		
29														1.00		
30														0.90		
31														0.90		

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3 No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														0.80		
2														1.00		
3														1.00		
4														1.10		
5														0.90		
6														1.10		
7														1.20		
8														1.00		
9														0.80		
10														0.50		
11														0.50		
12														0.50		
13														0.90		
14														0.80		
15														0.80		
16														0.90		
17														0.70		
18														0.80		
19														0.90		
20														0.90		
21														1.00		
22														1.10		
23														1.00		
24														1.00		
25														0.90		
26														1.00		
27														0.80		
28														0.70		0.07
29														1.00		
30														0.90		
31																

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3 No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														0.90		
2														0.90		
3														1.20		
4														1.10		
5														1.00		
6														1.00		
7														1.00		
8														0.90		
9														0.90		
10														0.80		
11														0.90		0.08
12														1.10		
13														1.00		
14														1.00		
15														1.00		
16														1.10		
17														1.10		
18														1.00		
19														1.00		
20														0.90		
21														0.80		
22														0.80		
23														0.70		
24														0.90		
25														0.90		
26														0.60		
27														0.80		
28														1.00		
29														0.80		
30														0.70		
31														0.70		

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   $C^{\cdot}_2$ used, measured once per month. Only total Cl_2 residual is measured.
3 No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														0.70		
2														0.60		
3														0.80		
4														0.90		
5														0.80		
6														0.70		
7														0.80		
8														1.00		
9														1.00		
10														0.80		
11														0.80		
12														0.80		
13														0.60		
14														0.70		
15														0.80		
16														0.90		
17														0.90		
18														0.80		
19														1.00		
20														1.00		
21														1.10		
22														1.10		
23														1.10		
24														1.10		
25														1.00		
26														0.50		
27														0.50		
28														0.70		
29														0.90		
30														0.90		
31														0.60		

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3 No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														0.80		
2														0.90		
3														1.00		
4														0.80		
5														0.80		
6														0.80		
7														0.50		
8														0.60		
9														0.70		
10														0.90		
11														1.00		
12														0.90		
13														0.90		
14														1.00		
15														1.00		
16														1.00		
17														0.80		
18														0.80		
19														0.90		
20														0.80		
21														0.90		
22														0.90		
23														1.00		
24														0.90		
25														0.90		
26														0.90		
27														0.90		
28														0.70		
29																
30																
31																

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3 No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														0.90		
2														0.90		
3														0.70		
4														0.70		
5														0.70		
6														0.80		
7														1.20		
8														1.20		
9														1.00		
10														1.00		
11														1.00		
12														0.90		
13														0.70		
14														0.60		
15														0.80		
16														1.00		
17														1.10		
18														0.90		
19														1.00		
20														0.90		
21														0.70		
22														0.80		
23														0.70		
24														0.70		
25														1.00		
26														0.90		
27														1.00		
28														0.90		
29														0.90		
30														1.10		
31														0.90		

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
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DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														1.20		
2														1.10		0.07
3														1.10		
4														0.90		
5														1.00		
6														1.00		
7														0.90		
8														0.90		
9														0.90		
10														0.90		
11														0.90		
12														0.80		
13														0.80		
14														0.90		
15														0.90		
16														0.90		
17														0.90		
18														0.80		
19														1.00		
20														0.90		
21														1.00		
22														1.10		
23														0.90		
24														0.80		
25														0.70		
26														0.90		
27														1.00		
28														1.00		
29														0.90		
30														1.00		
31																

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
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4. No NH_3 used at plant.

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														0.90		
2														0.80		
3														1.20		
4														1.30		
5														1.50		
6														1.20		
7														0.90		
8														1.00		
9														1.30		
10														1.00		
11														1.10		
12														1.10		
13														1.00		
14														1.10		0.06
15														1.00		
16														1.70		
17														1.10		
18														1.10		
19														1.60		
20														1.10		
21														0.90		
22														1.20		
23														1.20		
24														1.10		
25														1.10		
26														0.90		
27														1.10		
28														1.10		
29														1.00		
30														0.90		
31														1.30		

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
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4. No NH_3 used at plant.

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														1.20		
2														1.10		
3														1.10		
4														0.90		
5														0.90		
6														0.80		
7														0.70		
8														1.00		
9														0.90		
10														1.00		
11														1.10		
12														1.10		
13														1.10		
14														1.10		
15														1.00		
16														0.90		
17														0.90		
18														0.90		
19														1.00		
20														1.00		
21														1.00		
22														1.00		
23														0.70		
24														0.70		
25														0.90		
26														1.20		
27														0.90		
28														1.00		
29														0.90		
30														0.90		
31																

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3 No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														1.00		
2														0.90		
3														0.90		
4														1.00		
5														1.00		
6														1.00		
7														1.00		
8														1.30		0.06
9														0.90		
10														0.90		
11														0.80		
12														0.70		
13														0.90		
14														0.90		
15														1.10		
16														0.90		
17														1.10		
18														1.10		
19														1.00		
20														0.90		
21														1.10		
22														1.20		
23														1.10		
24														1.10		
25														1.10		
26														1.00		
27														0.80		
28														1.00		
29														0.90		
30														0.70		
31														1.10		

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3 No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														1.20		
2														1.10		
3														1.00		
4														0.90		
5														1.00		
6														1.00		
7														0.90		
8														1.20		
9														0.90		
10														1.00		
11														1.50		
12														1.40		
13														1.30		
14														1.30		
15														1.30		
16														0.90		
17														0.90		
18														0.80		
19														1.30		
20														1.20		
21														1.30		
22														1.10		
23														1.20		
24														1.00		
25														1.10		
26														1.20		
27														1.10		
28														1.20		
29														1.10		
30														1.00		
31														1.00		

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3 No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														1.00		
2														1.20		
3														1.20		
4														1.20		
5														1.00		
6														1.10		
7														1.20		
8														1.20		
9														1.20		
10														1.10		
11														1.10		
12														1.10		
13														1.00		
14														1.00		
15														0.80		
16														1.00		
17														0.90		
18														0.90		
19														0.80		
20														0.90		
21														0.80		
22														0.80		
23														0.90		
24														0.90		
25														0.90		
26														0.80		
27														0.80		
28														0.80		
29														0.90		
30														0.90		
31																

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   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
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DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														1.00		
2														1.00		
3														0.90		
4														0.90		
5														1.00		
6														0.70		
7														0.80		
8														0.80		
9														0.80		
10														1.00		
11														0.90		
12														0.90		
13														0.90		
14														1.00		
15														0.90		
16														0.90		
17														0.90		
18														1.00		
19														1.10		
20														1.20		
21														1.00		
22														0.70		
23														0.90		
24														0.90		
25														1.00		
26														1.00		
27														0.90		
28														1.10		
29														1.00		
30														0.90		
31														0.90		

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DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Cl_2		NH_3	SO_2	RESIDUAL Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														0.90		
2														0.80		
3														0.70		
4														0.60		
5														0.70		0.10
6														0.80		
7														1.00		
8														1.10		
9														1.00		
10														1.00		
11														1.00		
12														1.20		
13														1.10		
14														1.00		
15														1.10		
16														1.10		
17														1.10		
18														1.20		
19														1.30		
20														1.00		
21														0.70		
22														1.00		
23														0.90		
24														1.00		
25														1.10		
26														1.10		
27														1.10		
28														1.10		
29														1.10		
30														1.00		
31																

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2. Dosages not measured on a daily basis.
   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
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DATE	PRE-CHLORINATION							POST-CHLORINATION							FLUORIDE	
	Cl_2		NH_3	SO_2	Residual Cl_2			Cl_2		NH_3	SO_2	Residual Cl_2			Dos.	Res.
	Dem.	Dos.			Free	Comb.	Total	Dem.	Dos.			Free	Comb.	Total		
1														1.10		
2														1.10		
3														0.90		0.10
4														0.90		
5														1.00		
6														1.00		
7														0.90		
8														0.70		
9														0.80		
10														0.80		
11														0.70		
12														0.70		
13														0.80		
14														0.80		
15														0.80		
16														1.00		
17														0.80		
18														0.80		
19														0.70		
20														1.00		
21														1.00		
22														1.10		
23														1.00		
24														0.90		
25														1.00		
26														1.00		
27														1.00		
28														1.00		
29														0.90		
30														0.90		
31														0.90		

Source: WTP Utility Monitoring Records, Sheet B-2

Notes:
1. No Prechlorination at WTP.
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   Cl_2 used, measured once per month. Only total Cl_2 residual is measured.
3. No Dechlorination practiced at WTP.
4. No NH_3 used at plant.

TABLE 4.0

GENERAL CHEMISTRY			1986			1985			1984			1983			DWSP DETECTION LIMIT*	DRINKING WATER OBJ/ GUIDELINE(1)
			MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG		
GENERAL CHEMISTRY																
ALKALINITY		R	119 0	73.4	99.2	180.0	69.4	111 4	119.0	90.0	107.7				0.2	
	mg/L	T	84.0	71.0	79.7	113.0	48.4	77.5	123.0	70.2	94.4				mg/L	
AMMONIUM TOTAL		R							0.075	0.075	0.075				0.05	
	mg/L	T	<W	<W	<W	<W	<W	<W	0.005	0.005	0.005				mg/L	
CALCIUM		R	69.0	43.7	58.9	78.5	20.5	42.6							0.1	
	mg/L	T	65.0	46.3	59.2	79.0	22.0	46.2							mg/L	
CHLORIDE		R	17.5	9.5	13.2	26.0	9.4	16.6	19.0	14.5	16.5				0.2	250
	mg/L	T	16 6	15.0	15.7	29 0	10.6	19.1	20.0	18.0	18.7	19.0	19.0	19.0	mg/L	mg/L
COLOUR	TCU	R	60	5	20	31	3	15	24	8	13	42	4	18	0.5	5
		T	3	1	2	6	<1	3	5	<1	2	4	1	2	TCU	TCU
CONDUCTIVITY		R	489	214	345	552	201	333							0.01	
	umho/cm	T	474	315	399	570	209	363							UMHO/CM	
FIELD CHLORINE		R	NA	NA	NA	NA	NA	NA							0.1	
(COMBINED)	mg/L	T	0.20	0.07	0.12	1.00	0.10	0.40							mg/L	
FIELD CHLORINE		R													0.1	
(FREE)	mg/L	T							0.98	0.72	0.90	0.95	0.70	0.81	mg/L	
FIELD CHLORINE		R	NA	NA	NA	NA	NA	NA							0.1	
(TOTAL)	mg/L	T	>1.00	0.70	0.88	1.20	0.85	1.01							mg/L	
FIELD pH		R	8.7	7.5	8.0	8.5	8.1	8.3	8.3	7.5	8.0				0.2	
		T	7.9	7.4	7.7	7.6	7.2	7.4	7.6	7.4	7.5					

Source: Drinking Water Surveillance Program

GENERAL CHEMISTRY (cont'd)		1986			1985			1984			1983			DWSP DETECTION LIMIT*	DRINKING WATER OBJ/ GUIDELINE(1)
		MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG		
FIELD TEMPERATURE DEG.C	R	22	4	12	22	6	13	23	6	13	24	7	14		
	T	23	10	16	24	10	16	25	12	17	24	11	17		
FIELD TURBIDITY FTU	R	59.00	4.20	15.46	66.00	1.00	17.74	230.0	1.00	17.20	200.0	0.80	15.67		1 FTU
	T	0.44	0.18	0.33	0.34	0.15	0.26	4.10	0.09	0.42	2.50	0.14	0.26		
FLUORIDE mg/L	R	0.14	0.10	0.12	0.19	0.10	0.13	0.13	0.10	0.11	0.10	0.10	0.10	0.01	2.4
	T	0.10	0.06	0.08	0.10	0.07	0.09	0.10	0.10	0.10	0.11	0.04	0.10	22	mg/L
HARDNESS mg/L	R	161	86	121	266	82	150	162	125	147				0.5	
	T	165	142	152	266	87	156	169	134	156				mg/L	
MAGNESIUM mg/L	R	15.4	10.4	13.3	16.9	7.5	11.0							0.05	
	T	14.4	10.2	13.1	16.8	7.7	11.3							mg/L	(c)
NITRATE mg/L	R	2.30	0.10	0.87	5.50	1.35	3.43	1.58	0.90	1.22				0.05	10 mg/L
	T	2.23	1.71	1.86	5.50	1.75	3.63	1.75	1.18	1.43				mg/L	as N
NITRITE mg/L	R	0.035	0.010	0.018	0.075	0.010	0.036	0.017	0.006	0.013				0.005	1 mg/L
	T	<W	<W	<W	0.01<T	<W		0.001	0.001	0.001				mg/L	as N
NITROGEN TOTAL KJELDAHL mg/L	R	0.40	0.22	0.30	1.00	0.40	0.63	0.50	0.33	0.41				0.1	0.15
	T	0.27	0.18	0.22	0.6<T	0.2<T	0.4<T	0.24	0.19	0.22				mg/L	mg/L (*)
pH	R	8.0	7.4	7.6	8.9	7.8	8.3	8.3	7.5	8.0					
	T	7.6	7.0	7.3	7.6	6.8	7.3	7.6	7 4	7.5					
PHOSPHORUS FILTERED REACTIVE mg/L	R	0.004	0.003	0.004										0.01	
	T	0.001	<W	<W	0.01<T	<W	<W							mg/L	

Source: Drinking Water Surveillance Program

GENERAL CHEMISTRY (cont'd)		1986			1985			1984			1983			DWSP DETECTION LIMIT*	DRINKING WATER OBJ/ GUIDELINE(1)
		MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG		
PHOSPHORUS TOTAL	R	0.024	0.008	0.017	0.020	0.020	0.020							0.01	
mg/L	T	<W	<W	<W	0.06<T	0.01<T	0.03<T							mg/L	
SODIUM	R	10.0	7.1	8.4	9.3	5.5	7.5							0.1	
mg/L	T	10.0	7.0	8.9	8.8	5.8	7.6							mg/L	
TOTAL SOLIDS	R	302	241	273	413	131	238							1	
mg/L	T	304	230	278	394	136	246							mg/L	
TURBIDITY	R	45.0	6.0	16.3	85.0	1 3	23.4							0.01	1
FTU	T	0.40<T	0.28<T	0.33<T	0.30<T	0.08<T	0.17<T							FTU	FTU
METALS															
ALUMINUM	R	1.600	0.120	0.463	2.700	0.082	0.712							0.003	
mg/L	T	0.060	0.011	0.042	0.220	0.015	0.071							mg/L	
ARSENIC	R	0.001	<W		<W	<W	<W							0.001	0.05
mg/L	T	<W	<W	<W	<W	<W	<W							mg/L	mg/L
BARIUM	R	0.02	0.02	0.02	0.03	0.01	0.02							0.001	1
mg/L	T	0.02	0.02	0.02	0.03	0.01	0.02							mg/L	mg/L
BERYLLIUM	R	<W	<W	<W	<W	<W	<W							0.001	
mg/L	T	<W	<W	<W	<W	<W	<W							mg/L	
BORON	R	0.09	0.03	0.06	0.15	<0.05	0.09							0.02	5
mg/L	T	0.06	0.04	0.05	0.13	<0.05	0.07							mg/L	mg/L
CADMIUM	R	<W	<W	<W	<W	<W	<W							0.0003	0.005
mg/L	T	<W	<W	<W	<W	<W	<W							mg/L	mg/L

Source: Drinking Water Surveillance Program

METALS (cont'd)			1986			1985			1984			1983			DWSP DETECTION LIMIT*	DRINKING WATER OBJ/ GUIDELINE(1)
			MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG		
CHROMIUM		R	0.003	0.002	0.003	0.008	0.002	0.004							0.001	0.05
	mg/L	T	0.003	0.002	0.003	0.005	0.002	0.003							mg/L	mg/L
COBALT		R	0.001	0.001	0.001	.002<T	.002<T	.002<T							0.001	
	mg/L	T	0.001	0.001	0.001	<W	<W	<W							mg/L	
COPPER		R	0.010	0.005	0.007	0.008	0.002	0.005							0.001	1
	mg/L	T	0.022	0.016	0.075	0.029	0.013	0.021							mg/L	mg/L
CYANIDE		R	<W	<W	<W	<W	<W	<W							0.001	0.2
	mg/L	T	<W	<W	<W	<W	<W	<W							mg/L	mg/L
IRON		R	1.60	0.11	0.47	3.00	0.04	0.68	0.21	0.13	0.18				0.002	0.3
	mg/L	T	0.06	0.03	0.05	0.07	0.02	0.04	0.03	0.01	0.02	0.01	0.01	0.01	mg/L	mg/L
LEAD		R	0.003	0.003	0.003	0.005	0.003	0.004							0.003	0.05
	mg/L	T	0.005	0.005	0.005	<W	<W	<W							mg/L	mg/L
MANGANESE		R	0.051	0.013	0.029	0.030	0.004	0.014							0.001	0.05
	mg/L	T	0.033	0.009	0.021	0.013	0.003	0.007							mg/L	mg/L
MOLYBDENUM		R	0.001	0.001	0.001	0.004	0.001	0.002							0.001	
	mg/L	T	0.001	0.001	0.001	0.003	0.001	0.002							mg/L	
MERCURY		R	0.01	0.01	0.01	0.02	0.01	0.01							0.01	1
	ug/L	T	0.01	0.01	0.01	0.01	0.01	0.01							ug/L	ug/L
NICKEL		R	0.003	0.002	0.002	0.004	0.002	0.003							0.002	
	mg/L	T	0.002	0.002	0.002	0.002	0.001	0.002							mg/L	

Source: Drinking Water Surveillance Program

METALS (cont'd)		1986			1985			1984			1983			DWSP DETECTION LIMIT*	DRINKING WATER OBJ/ GUIDELINE(1)
		MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG		
SELENIUM	R	<W	<W	<W	<W	<W	<W							0.001	0.01
mg/L	T	<W	<W	<W	<W	<W	<W							mg/L	mg/L
STRONTIUM	R	0.180	0.060	0.133	0.190	0.100	0.136							0.001	
mg/L	T	0.170	0.127	0.157	0.190	0.097	0.153							mg/L	
TIN	R														
(no units available)	T														
URANIUM	R	<W	<W	<W	<W	<W	<W							0.002	0.02
mg/L	T	<W	<W	<W	<W	<W	<W							mg/L	mg/L (t)
VANADIUM	R	0.004	0.001	0.003	0.009	0.001	0.004							0.001	
mg/L	T	0.004	0.004	0.004	0.003	0.002	0.003							mg/L	
ZINC	R	0.094	0.012	0.037	0.016	0.003	0.009							0.001	5
mg/L	T	0.022	0.010	0.016	0.011	0.006	0.009							mg/L	mg/L (h)
PURGEABLES															
BENZENE	R	<W	<W	<W	<W	<W	<W							1	10
ug/L	T	<W	<W	<W	<W	<W	<W							ug/L	ug/L (h)
BROMOFORM	R	<W	<W	<W	<W	<W	<W							1	350
ug/L	T	<W	<W	<W	<W	<W	<W							ug/L	ug/L (++)
CARBON TETRACHLORIDE	R	<W	<W	<W	<W	<W	<W							1	3
ug/L	T	<W	<W	<W	<W	<W	<W							ug/L	ug/L (h)
CHLOROBENZENE	R	<W	<W	<W	<W	<W	<W							1	100-300
ug/L	T	<W	<W	<W	<W	<W	<W							ug/L	ug/L (h*)

Source: Drinking Water Surveillance Program

PURGEABLES (cont'd)		1986 MAX	1986 MIN	1986 AVG	1985 MAX	1985 MIN	1985 AVG	1984 MAX	1984 MIN	1984 AVG	1983 MAX	1983 MIN	1983 AVG	DWSP DETECTION LIMIT*	DRINKING WATER OBJ/ GUIDELINE(1)
CHLORODIBROMOMETHANE	R	<W	<W	<W	<W	<W	<W							1	350
ug/L	T	19	11	16	20	5	11							ug/L	ug/L (++)
CHLOROFORM	R	<W	<W	<W	<W	<W	<W							1	350
ug/L	T	40	32	36	55	29	39							ug/L	ug/L (++)
1,2-DICHLOROBENZENE	R	<W	<W	<W	<W	<W	<W							1	400
ug/L	T	<W	<W	<W	<W	<W	<W							ug/L	ug/L (e)
1,3-DICHLOROBENZENE	R	<W	<W	<W	<W	<W	<W							1	400
ug/L	T	<W	<W	<W	<W	<W	<W							ug/L	ug/L (e)
1,4-DICHLOROBENZENE	R	<W	<W	<W	<W	<W	<W							1	400
ug/L	T	<W	<W	<W	<W	<W	<W							ug/L	ug/L (e)
DICHLOROBROMOMETHANE	R	<W	<W	<W	<W	<W	<W							1	350
ug/L	T	19	15	17	25	10	16							ug/L	ug/L (++)
1,1-DICHLOROETHANE	R	<W	<W	<W	<W	<W	<W							1	
ug/L	T	<W	<W	<W	<W	<W	<W							ug/L	
1,2-DICHLOROETHANE	R	<W	<W	<W	<W	<W	<W							1	10
ug/L	T	<W	<W	<W	<W	<W	<W							ug/L	ug/L (h)
1,1-DICHLOROETHYLENE	R	<W	<W	<W	<W	<W	<W							1	.3
ug/L	T	<W	<W	<W	<W	<W	<W							ug/L	ug/L (h)
T,1,2-DICHLOROETHYLENE	R	<W	<W	<W	<W	<W	<W							1	
ug/L	T	<W	<W	<W	<W	<W	<W							ug/L	

Source: Drinking Water Surveillance Program

PURGEABLES (cont'd)		1986 MAX	1986 MIN	1986 AVG	1985 MAX	1985 MIN	1985 AVG	1984 MAX	1984 MIN	1984 AVG	1983 MAX	1983 MIN	1983 AVG	DWSP DETECTION LIMIT*	DRINKING WATER OBJ/ GUIDELINE(1)
DICHLOROMETHANE	R	<W	<W	<W	<W	<W	<W							5	40
ug/L	T	18	18	18	<W	<W	<W							ug/L	ug/L (c)
1,2-DICHLOROPROPANE	R	<W	<W	<W	<W	<W	<W							1	
ug/L	T	<W	<W	<W	<W	<W	<W							ug/L	
ETHYLBENZENE	R	<W	<W	<W	<W	<W	<W							1	1400
ug/L	T	<W	<W	<W	<W	<W	<W							ug/L	ug/L (e)
ETHYLENE DIBROMIDE	R														
ug/L	T														
m-XYLENE	R	<W	<W	<W	<W	<W	<W							1	620
ug/L	T	<W	<W	<W	<W	<W	<W							ug/L	ug/L (c)
o-XYLENE	R	<W	<W	<W	<W	<W	<W							1	620
ug/L	T	<W	<W	<W	<W	<W	<W							ug/L	ug/L (c)
p-XYLENE	R	<W	<W	<W	<W	<W	<W							1	620
ug/L	T	<W	<W	<W	<W	<W	<W							ug/L	ug/L (c)
TOLUENE	R	<W	<W	<W	<W	<W	<W							1	100
ug/L	T	<W	<W	<W	<W	<W	<W							ug/L	ug/L (c)
1,1,2,2-TETRACHLOROETHYLENE	R	<W	<W	<W	<W	<W	<W							1	1.7
ug/L	T	<W	<W	<W	<W	<W	<W							ug/L	ug/L (e)
TETRACHLOROETHYLENE	R	<W	<W	<W	<W	<W	<W							1	10
ug/L	T	<W	<W	<W	<W	<W	<W							ug/L	ug/L (h)

Source: Drinking Water Surveillance Program

PURGEABLES (cont'd)		1986 MAX	1986 MIN	1986 AVG	1985 MAX	1985 MIN	1985 AVG	1984 MAX	1984 MIN	1984 AVG	1983 MAX	1983 MIN	1983 AVG	DWSP DETECTION LIMIT*	DRINKING WATER OBJ/ GUIDELINE(1)
1,1,1- TRICHLOROETHANE	R	<W	<W	<W	<W	<W	<W							1	1000
ug/L	T	<W	<W	<W	<W	<W	<W							ug/L	ug/L (c)
1,1,2- TRICHLOROETHANE	R	<W	<W	<W	<W	<W	<W							1	6
ug/L	T	<W	<W	<W	<W	<W	<W							ug/L	ug/L (e)
TRICHLOROETHYLENE	R	<W	<W	<W	<W	<W	<W							1	30
ug/L	T	<W	<W	<W	<W	<W	<W							ug/L	ug/L (h)
TOTAL TRIHALOMEMETHANES	R	<W	<W	<W	<W	<W	<W							3	350
ug/L	T	77	63	69	100	50	66							ug/L	ug/L (++)
TRIFLUOROCHLOROTOLUENE	R	<W	<W	<W	<W	<W	<W							1	
ug/L	T	<W	<W	<W	<W	<W	<W							ug/L	
ORGANOCHLORINES															
ALDRIN	R	<W	<W	<W	<W	<W	<W							1	700
ng/L	T	<W	<W	<W	<W	<W	<W							ng/L	ng/L (**)
ALPHA BHC	R	3<T	1<T	2<T	2<T	2<T	2<T							1	700
ng/L	T	4<T	1<T	3<T	4<T	1<T	3<T							ng/L	ng/L (c)
ALPHA CHLORDANE	R	<W	<W	<W	<W	<W	<W							2	700
ng/L	T	<W	<W	<W	<W	<W	<W							ng/L	ng/L (***)
BETA BHC	R	<W	<W	<W	<W	<W	<W							1	300
ng/L	T	<W	<W	<W	<W	<W	<W							ng/L	ng/L (c)
DIELDRIN	R	<W	<W	<W	<W	<W	<W							2	700
ng/L	T	<W	<W	<W	<W	<W	<W							ng/L	ng/L (**)

Source: Drinking Water Surveillance Program

ORGANOCHLORINES (cont'd)		1986 MAX	1986 MIN	1986 AVG	1985 MAX	1985 MIN	1985 AVG	1984 MAX	1984 MIN	1984 AVG	1983 MAX	1983 MIN	1983 AVG	DWSP DETECTION LIMIT*	DRINKING WATER OBJ/ GUIDELINE(1)
ENDRIN	R	<W	<W	<W	<W	<W	<W							4	200
ng/L	T	<W	<W	<W	<W	<W	<W							ng/L	ng/L
GAMMA CHLORDANE	R	<W	<W	<W	<W	<W	<W							2	700
ng/L	T	<W	<W	<W	<W	<W	<W							ng/L	ng/L (***)
HEPTACHLOR EPOXIDE	R	<W	<W	<W	<W	<W	<W							1	3000
ng/L	T	<W	<W	<W	<W	<W	<W							ng/L	ng/L (+++)
HEPTACHLOR	R	<W	<W	<W	<W	<W	<W							1	3000
ng/L	T	<W	<W	<W	3<T	1<T	2<T							ng/L	ng/L (+++)
HEXACHLOROBENZENE	R	<W	<W	<W	<W	<W	<W							1	10
ng/L	T	<W	<W	<W	3<T	1<T	2<T							ng/L	ng/L (h)
HEXACHLOROBUTADIENE	R	2<T	2<T	2<T	<W	<W	<W								
ng/L	T	4<T	4<T	4<T	2<T	2<T	2<T								
HEXACHLOROETHANE	R	<W	<W	<W	<W	<W	<W							1	19000
ng/L	T	<W	<W	<W	5<T	5<T	5<T							ng/L	ng/L (e)
LINDANE	R	<W	<W	<W	<W	<W	<W							1	4000
ng/L	T	4<T	4<T	4<T	3<T	1<T	2<T							ng/L	ng/L
METHOXYCHLOR	R	<W	<W	<W	<W	<W	<W							5	100000
ng/L	T	<W	<W	<W	<W	<W	<W							ng/L	ng/L
MIREX	R	<W	<W	<W	<W	<W	<W							5	
ng/L	T	<W	<W	<W	<W	<W	<W							ng/L	

Source: Drinking Water Surveillance Program

ORGANOCHLORINES (cont'd)		1986			1985			1984			1983			DWSP DETECTION LIMIT*	DRINKING WATER OBJ/ GUIDELINE(1)
		MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG		
OCTACHLOROSTYRENE	R	<W	<W	<W	<W	<W	<W							1	
ng/L	T	<W	<W	<W	<W	<W	<W							ng/L	
o,p-DDT	R	<W	<W	<W	<W	<W	<W							5	30000
ng/L	T	<W	<W	<W	<W	<W	<W							ng/L	ng/L (d)
OXYCHLORDANE	R	<W	<W	<W	<W	<W	<W							2	
ng/L	T	<W	<W	<W	<W	<W	<W							ng/L	
PCB TOTAL	R	<W	<W	<W	<W	<W	<W							20	3000
ng/L	T	<W	<W	<W	<W	<W	<W							ng/L	ng/L (t)
PENTACHLOROBENZENE	R	<W	<W	<W	<W	<W	<W							1	74000
ng/L	T	<W	<W	<W	<W	<W	<W							ng/L	ng/L (e)
p,p-DDD	R	<W	<W	<W	<W	<W	<W							5	(d)
ng/L	T	<W	<W	<W	<W	<W	<W							ng/L	
p,p-DDE	R	<W	<W	<W	<W	<W	<W							1	(d)
ng/L	T	<W	<W	<W	<W	<W	<W							ng/L	
p,p-DDT	R	<W	<W	<W	<W	<W	<W							5	(d)
ng/L	T	<W	<W	<W	<W	<W	<W							ng/L	
1,2,3,4-TETRACHLOROBENZENE	R	<W	<W	<W	<W	<W	<W							1	
ng/L	T	<W	<W	<W	<W	<W	<W							ng/L	
1,2,3,5-TETRACHLOROBENZENE	R	<W	<W	<W	<W	<W	<W							1	
ng/L	T	<W	<W	<W	10	9<T								ng/L	

Source: Drinking Water Surveillance Program

ORGANOCHLORINES (cont'd)		1986 MAX	1986 MIN	1986 AVG	1985 MAX	1985 MIN	1985 AVG	1984 MAX	1984 MIN	1984 AVG	1983 MAX	1983 MIN	1983 AVG	DWSP DETECTION LIMIT*	DRINKING WATER OBJ/ GUIDELINE(1)
1,2,3,5-TETRACHLOROBENZENE ng/L	R	<W	<W	<W	<W	<W	<W							1 ng/L	38000 ng/L (e)
	T	<W	<W	<W	25	6<T									
THIODAN I ng/L	R	<W	<W	<W	<W	<W	<W							2 ng/L	74000 ng/L (ea)
	T	<W	<W	<W	<W	<W	<W								
THIODAN II ng/L	R	<W	<W	<W	<W	<W	<W							4 ng/L	74000 ng/L (ea)
	T	5<T	5<T	5<T	<W	<W	<W								
THIODAN SULPHATE ng/L	R	<W	<W	<W	<W	<W	<W							4 ng/L	
	T	<W	<W	<W	<W	<W	<W								
TOXAPHENE (no units available)	R														
	T														
1,2,3-TRICHLOROBENZENE ng/L	R	<W	<W	<W	<W	<W	<W							5 ng/L	10000 ng/L (y)
	T	<W	<W	<W	<W	<W	<W								
1,2,4-TRICHLOROBENZENE ng/L	R	<W	<W	<W	<W	<W	<W							5 ng/L	15000 ng/L (y)
	T	<W	<W	<W	<W	<W	<W								
1,3,5-TRICHLOROBENZENE ng/L	R	<W	<W	<W	<W	<W	<W							5 ng/L	10000 ng/L (y)
	T	<W	<W	<W	12<T	9<T	11<T								
2,3,6-TRICHLOROTOLUENE ng/L	R	<W	<W	<W	<W	<W	<W							5 ng/L	
	T	<W	<W	<W	1<T	1<T	1<T								
2,4,5-TRICHLOROTOLUENE ng/L	R	<W	<W	<W	<W	<W	<W							5 ng/L	10000 ng/L (g)
	T	<W	<W	<W	<W	<W	<W								

Source: Drinking Water Surveillance Program

ORGANOCHLORINES (cont'd)		1986			1985			1984			1983			DWSP DETECTION LIMIT*	DRINKING WATER OBJ/ GUIDELINE(1)
		MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG		
2,6,A-TRICHLOROTOLUENE	R	<W	<W	<W	<W	<W	<W							5	
mg/L	T	20<T	20<T	20<T	5<T	5<T	5<T							ng/L	
TRIAZINES															
ALACHLOR	R														
ng/L	T														
AMETRINE	R	+	+	+	<W	<W	<W							50	
ng/L	T	+	+	+	<W	<W	<W							ng/L	
ATRATONE	R														
ng/L	T														
ATRAZINE	R	+	+	+	<W	<W	<W							50	46000
ng/L	T	+	+	+	<W	<W	<W							ng/L	ng/L (!)
BLADEX	R	+	+	+	<W	<W	<W							100	10000
ng/L	T	+	+	+	<W	<W	<W							ng/L	ng/L (!)
METOLACHLOR	R														
ng/L	T														
PROMETONE	R	+	+	+	<W	<W	<W							50	
ng/L	T	+	+	+	<W	<W	<W							ng/L	
PROMETRYNE	R	+	+	+	<W	<W	<W							50	1000
ng/L	T	+	+	+	<W	<W	<W							ng/L	ng/L (!)
PROPAZINE	R	+	+	+	<W	<W	<W							50	
ng/L	T	+	+	+	<W	<W	<W							ng/L	

Source: Drinking Water Surveillance Program

TRIAZINES (cont'd)		1986 MAX	1986 MIN	1986 AVG	1985 MAX	1985 MIN	1985 AVG	1984 MAX	1984 MIN	1984 AVG	1983 MAX	1983 MIN	1983 AVG	DWSP DETECTION LIMIT*	DRINKING WATER OBJ/ GUIDELINE(1)
SENCOR	R	+	+	+	<W	<W	<W							100	
ng/L	T	+	+	+	<W	<W	<W							ng/L	
SIMAZINE	R	+	+	+	<W	<W	<W							50	10000
ng/L	T	+	+	+	<W	<W	<W							ng/L	ng/L (!)
SPECIAL PESTICIDES															
2,4-D	R	+	+	+	<W	<W	<W							100	100000
ng/L	T	+	+	+	<W	<W	<W							ng/L	ng/L
2,4-D BUTYRIC ACID	R	+	+	+	<W	<W	<W							200	18000
ng/L	T	+	+	+	<W	<W	<W							ng/L	ng/L (!)
DICAMBA	R	+	+	+	<W	<W	<W							100	87000
ng/L	T	+	+	+	<W	<W	<W							ng/L	ng/L (!)
PENTACHLOROPHENOL	R	+	+	+	<W	<W	<W							50	10000
ng/L	T	+	+	+	<W	<W	<W							ng/L	ng/L (h)
PICLORAM	R	+	+	+	<W	<W	<W							100	
ng/L	T	+	+	+	<W	<W	<W							ng/L	
2,4-D PROPIONIC ACID	R	+	+	+	<W	<W	<W							100	
ng/L	T	+	+	+	<W	<W	<W							ng/L	
SILVEX	R	+	+	+	<W	<W	<W							50	10000
ng/L	T	+	+	+	<W	<W	<W							ng/L	ng/L
2,4,5-T	R	+	+	+	<W	<W	<W							50	
ng/L	T	+	+	+	<W	<W	<W							ng/L	

Source: Drinking Water Surveillance Program

SPECIAL PESTICIDES (cont'd)		1986			1985			1984			1983			DWSP DETECTION LIMIT*	DRINKING WATER OBJ/ GUIDELINE(1)
		MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG		
2,3,4,5-TETACHLOROPHENOL	R	+	+	+	<W	<W	<W							50	
ng/L	T	+	+	+	<W	<W	<W							ng/L	
2,3,5,6-TETACHLOROPHENOL	R	+	+	+	<W	<W	<W							50	
ng/L	T	+	+	+	<W	<W	<W							ng/L	
2,3,4-TRICHLOROPHENOL	R	+	+	+	<W	<W	<W							100	
ng/L	T	+	+	+	<W	<W	<W							ng/L	
2,4,5-TRICHLOROPHENOL	R	+	+	+	<W	<W	<W							50	
ng/L	T	+	+	+	<W	<W	<W							ng/L	
2,4,6-TRICHLOROPHENOL	R	+	+	+	<W	<W	<W							50	1000
ng/L	T	+	+	+	<W	<W	<W							ng/L	ng/L (h)
ORGANOPHOSPHOROUS PESTICIDES															
DIAZINON	R	+	+	+	<W	<W	<W							50	14000
ng/L	T	+	+	+	<W	<W	<W							ng/L	ng/L
DICHLOROVOS	R														
ng/L	T														
DURSBAN	R														
ng/L	T														
ETHION	R														
ng/L	T														
GUTHION	R														
ng/L	T														

Source: Drinking Water Surveillance Program

ORGANOPHOSPHOROUS PESTICIDES (cont'd)		1986 MAX	1986 MIN	1986 AVG	1985 MAX	1985 MIN	1985 AVG	1984 MAX	1984 MIN	1984 AVG	1983 MAX	1983 MIN	1983 AVG	DWSP DETECTION LIMIT*	DRINKING WATER OBJ/ GUIDELINE(1)
MALATHION	R														
ng/L	T														
METHYLPARATHION	R	+	+	+	<W	<W	<W							50	7000
ng/L	T	+	+	+	<W	<W	<W							ng/L	ng/L
METHYLTRITHION	R														
ng/L	T														
MEVINPHOS	R														
ng/L	T														
PARATHION	R	+	+	+	<W	<W	<W							50	35000
ng/L	T	+	+	+	<W	<W	<W							ng/L	ng/L
PHORBATE	R														
ng/L	T														
RELDAN	R														
ng/L	T														
RONNEL	R														
ng/L	T														
MASS SPEC.															
DI-n-PHTHALATE	R	1.05	1.05	1.05	NS	NS	NS							0.1	34000
ug/L	T	0.75	0.75	0.75	NS	NS	NS							ug/L	ug/L (e)

Source: Drinking Water Surveillance Program

MASS SPEC. (cont'd)		1986 MAX	1986 MIN	1986 AVG	1985 MAX	1985 MIN	1985 AVG	1984 MAX	1984 MIN	1984 AVG	1983 MAX	1983 MIN	1983 AVG	DWSP DETECTION LIMIT*	DRINKING WATER OBJ/ GUIDELINE(1)
N-DICHLOROMETHYLENE-PENTACHLOROANALINE	R	<W	<W	<W	<W	<W	<W							0.1	
ug/L	T	<W	<W	<W	<W	<W	<W							ug/L	
DIPHENYL ETHER	R	<W	<W	<W	<W	<W	<W							0.1	
ug/L	T	<W	<W	<W	<W	<W	<W							ug/L	
FLUORANTHENE	R	<W	<W	<W	<W	<W	<W							0.1	
ug/L	T	<W	<W	<W	<W	<W	<W							ug/L	
HEXACHLOROPROPENE	R	<W	<W	<W	<W	<W	<W							0.1	
ug/L	T	<W	<W	<W	<W	<W	<W							ug/L	
METHYL PHENANTHRENE	R	<W	<W	<W	<W	<W	<W							0.1	
ug/L	T	<W	<W	<W	<W	<W	<W							ug/L	
NAPHTHALENE	R	<W	<W	<W	<W	<W	<W							0.1	
ug/L	T	<W	<W	<W	<W	<W	<W							ug/L	
PENTACHLOROBUTADIENE	R	<W	<W	<W	<W	<W	<W							0.1	
ug/L	T	<W	<W	<W	<W	<W	<W							ug/L	
PENTACHLOROPROPANE	R	<W	<W	<W	<W	<W	<W							0.1	
ug/L	T	<W	<W	<W	<W	<W	<W							ug/L	
PENTACHLOROPROPENE	R	<W	<W	<W	<W	<W	<W							0.1	
ug/L	T	<W	<W	<W	<W	<W	<W							ug/L	
PYRENE	R	<W	<W	<W	<W	<W	<W							0.1	
ug/L	T	<W	<W	<W	<W	<W	<W							ug/L	

Source: Drinking Water Surveillance Program

MASS SPEC. (cont'd)		1986 MAX	1986 MIN	1986 AVG	1985 MAX	1985 MIN	1985 AVG	1984 MAX	1984 MIN	1984 AVG	1983 MAX	1983 MIN	1983 AVG	DWSP DETECTION LIMIT*	DRINKING WATER OBJ/ GUIDELINE(1)
TETRACHLORBUTANE	R	<W	<W	<W	<W	<W	<W							0.1	
ug/L	T	<W	<W	<W	<W	<W	<W							ug/L	
TETRACHLOROBIPHENYL	R													0.1	
ug/L	T													ug/L	
BACTERIA															
RAW WATER:															
TOTAL COLIFORM MF	R	15000	12	192	2600	2	65								
count/100mL															
TOTAL COLIFORM BKGD	R	4600	435	1420	210000	500	14491								
count/mL															
FECAL COLIFORM MF	R	7	0	2	37	0	8							0	0/0.1 mL
count/100mL															
STANDARD PLATE COUNT MF	R	811	224	457	>2400	1	436							0	500
count/100mL															
TREATED WATER:															
PRESENT/ABSENT TEST	T	ABSENT	ABSENT	ABSENT	ABSENT	ABSENT	ABSENT								
TOTAL COLIFORM BACKGROUND MF	T	0	0	0	1	1	1							0	OWDO Bacti
count/100mL															

Source: Drinking Water Surveillance Program

BACTERIA (cont'd)		1986			1985			1984			1983			DWSP DETECTION LIMIT*	DRINKING WATER OBJ/ GUIDELINE(1)
		MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG		
TREATED WATER: (cont'd)															
FECAL COLIFORM MF count/100mL	T	NA	NA	NA	NA	NA	NA							0	ODWO Bacti
STANDARD PLATE COUNT MF count/100mL	T	2	1	1	72	0	13								
IF PRESENT/ABSENT TEST POSITIVE:															
COLIFORM P/A	T														
FECAL COLIFORM P/A	T														
E. COLI P/A	T														
AROMONAS P/A	T														
STAPH. AUREUS P/A	T														

Source: Drinking Water Surveillance Program

Table A - Footnotes

1 = see individual footnotes for Agency of guideline origin

c = California State Department of Health Action Level

d = OWDO for DDT (contains other isomers such as OPDDT and PPDT)

e = USEPA ambient guideline

ea = United States Environmental Protection Agency (USEPA) ambient level for endosulfan (contains other isomers)

ep = USEPA proposed maximum contaminant level for drinking water

g = suggested Health and Welfare Canada/Ontario Ministry of the Environment guideline value

h = World Health Organization (WHO) guideline

h* = World Health Organization (WHO) Odour Threshold

mg/L = milligrams per litre, parts per million, (ppm)

ng/L = nanograms per litre, parts per trillion, (ppt)

Presence/Absence = microbiological test to indicate presence or absence of coliform bacteria

R = raw water

T = Treated Drinking Water

t = ODWO Interim maximum acceptable concentration, (IMAC)

ug/L = micrograms per litre, parts per billion, (ppb)

y = New York State (Taste and Odour) proposed drinking water guideline

++ = total Ttrihalomethanes

+++ = combined total: Heptachlor and Heptachlor Epoxide

* = if other than DWSP Detection Limit

** = total of Aldrin and Dieldrin

*** = Chlordane is a mixture of alpha and gamma isomers

! = Ministry of the Environment and Health and Welfare Canada, (IMAC)

MITCHELL'S BAY

TABLE 5.0: ALGAE COUNT

MONTH	COUNT						
JAN	Max.						
	Min.						
	Avg.						
	No. Tests						
FEB	Max.						
	Min.						
	Avg.						
	No. Tests						
MAR	Max.						
	Min.						
	Avg.						
	No. Tests						
APR	Max.						
	Min.						
	Avg.						
	No. Tests						
MAY	Max.						
	Min.						
	Avg.						
	No. Tests						
JUN	Max.						
	Min.						
	Avg.						
	No. Tests						

NOTE: No algae counts conducted for WTP

TABLE 5.0: (cont'd)

MONTH	COUNT						
JUL	Max.						
	Min.						
	Avg.						
	No. Tests						
AUG	Max.						
	Min.						
	Avg.						
	No. Tests						
SEP	Max.						
	Min.						
	Avg.						
	No. Tests						
OCT	Max.						
	Min.						
	Avg.						
	No. Tests						
NOV	Max.						
	Min.						
	Avg.						
	No. Tests						
DEC	Max.						
	Min.						
	Avg.						
	No. Tests						

NOTE: No algae counts conducted for WTP

TABLE 6.0: BACTERIOLOGICAL TESTING (1986)

MONTH	R/T	TOTAL COLIFORM					FECAL COLIFORM					FECAL STREPTOCOCCUS			
		ABSENT	1-5	6-100	101-5000	>5000	ABSENT	1-5	6-100	101-500	>500	ABSENT	1	2-50	>50
JAN	R														
	T	4		3				1		1			2	2	
FEB	R														
	T	3		3	1			3		1			1	2	
MAR	R														
	T	4		1	3				1	3			1		3
APR	R														
	T	5		3	1			3					3	1	1
MAY	R														
	T	4	2	2									4		
JUN	R														
	T	4											2	2	
JUL	R														
	T	5	2		1								5		
AUG	R														
	T	4		1									3	1	
SEP	R														
	T	4		1				2					2	2	
OCT	R														
	T	5	1	3	1			2					2	3	
NOV	R														
	T	4		4				1	1				2	2	
DEC	R														
	T	5		2	3				1	3			1	3	1

NOTE: All results are for 100 mL samples; tests carried out at MOE lab, London.

Source: WTP Utilities Monitoring Records, Sheet B-3

TABLE 6.1: BACTERIOLOGICAL TESTING (1985)

MONTH	R/T	TOTAL COLIFORM					FECAL COLIFORM					FECAL STREPTOCOCCUS			
		ABSENT	1-5	6-100	101-5000	>5000	ABSENT	1-5	6-100	101-500	>500	ABSENT	1	2-50	>50
JAN	R		1	2	1			3		1				3	1
	T	4													
FEB	R			3	1			1		1			2	1	1
	T	4													
MAR	R			1	2					3			1	1	2
	T	4													
APR	R			2	2			1		2				3	1
	T	4													
MAY	R		3										5		
	T	5													
JUN	R		1	1						2			2	2	
	T	4													
JUL	R			1									4		
	T	4													
AUG	R			2									3	1	
	T	4													
SEP	R		2	1	1			1					3	1	
	T	4													
OCT	R		1	4											
	T	5													
NOV	R			1	3			1	1	2				4	
	T														
DEC	R			1	4			1	1	2			1	2	2
	T	5													

NOTE: All results are for 100 mL samples; tests carried out at MOE lab, London.

R = Raw; T = Treated

Source: WTP Utilities Monitoring Records, Sheet B-3

TABLE 6.2: BACTERIOLOGICAL TESTING (1984)

MONTH	R/T	TOTAL COLIFORM					FECAL COLIFORM					FECAL STREPTOCOCCUS			
		ABSENT	1-5	6-100	101-5000	>5000	ABSENT	1-5	6-100	101-500	>500	ABSENT	1	2-50	>50
JAN	R														
	T	4		4				2							
FEB	R														
	T	5		3	2				1	3			2	2	2
MAR	R														
	T	4		2	2			1		2			1	1	2
APR	R														
	T	3		2	1			1		1				3	
MAY	R														
	T	5		3						1			4	1	
JUN	R														
	T	3	1	1									3		
JUL	R														
	T	4		1									3	1	
AUG	R														
	T		2	1									4	1	
SEP	R														
	T	4	1	2				1					2	2	
OCT	R														
	T	5		4									3	2	
NOV	R														
	T	4	1	4				2		1				4	
DEC	R														
	T	3		3				1					1	2	

NOTE: All results are for 100 mL samples; tests carried out at MOE lab, London.

R = Raw; T = Treated

Source: WTP Utilities Monitoring Records, Sheet B-3

TABLE 6.3: BACTERIOLOGICAL TESTING (1983)

MONTH	R/T	TOTAL COLIFORM					FECAL COLIFORM					FECAL STREPTOCOCCUS			
		ABSENT	1-5	6-100	101-5000	>5000	ABSENT	1-5	6-100	101-500	>500	ABSENT	1	2-50	>50
JAN	R														
	T	4		2	2					2			1	2	1
FEB	R														
	T	4		2	1								2	1	1
MAR	R														
	T	5	1	2					1						
APR	R														
	T	4		2	1			1							
MAY	R														
	T	4	1	2	1		4			1		4	2	2	
JUN	R														
	T	5	1	4									3	2	
JUL	R														
	T	4	1	2									3	1	
AUG	R														
	T	5	1	1	1								4	1	
SEP	R														
	T	4		1									4		
OCT	R														
	T	4	1	1	1								2	2	
NOV	R														
	T			4						1			2	3	
DEC	R														
	T	4	1	3	1				1	2				2	1

NOTE: All results are for 100 mL samples; tests carried out at MOE lab, London.

R = Raw; T = Treated

Source: WTP Utilities Monitoring Records, Sheet B-3

MITCHELL'S BAY

TABLE 7.0: ONTARIO DRINKING WATER OBJECTIVES INCLUDING ALUMINUM (TREATED WATER AT PLANT)

DATE	PARAMETER	MEASURED PARAMETER	OBJECTIVE LIMIT

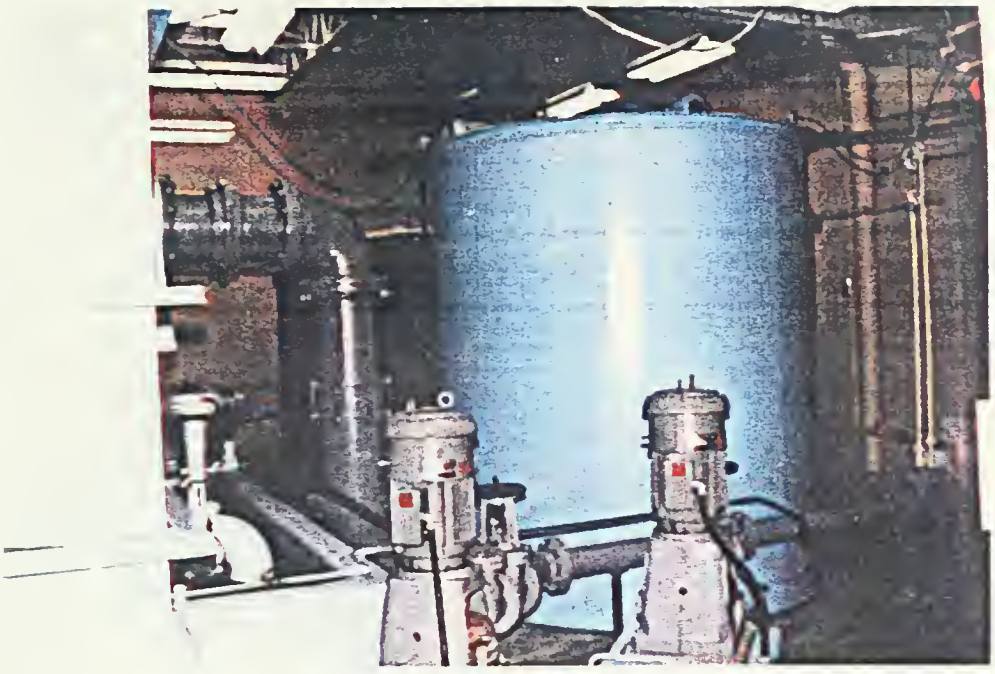
MITCHELL'S BAY

TABLE 7.1: ONTARIO DRINKING WATER OBJECTIVES (DISTRICT SYSTEM)

DATE	PARAMETER	MEASURED PARAMETER	OBJECTIVE LIMIT

APPENDIX III

PHOTOGRAPHS

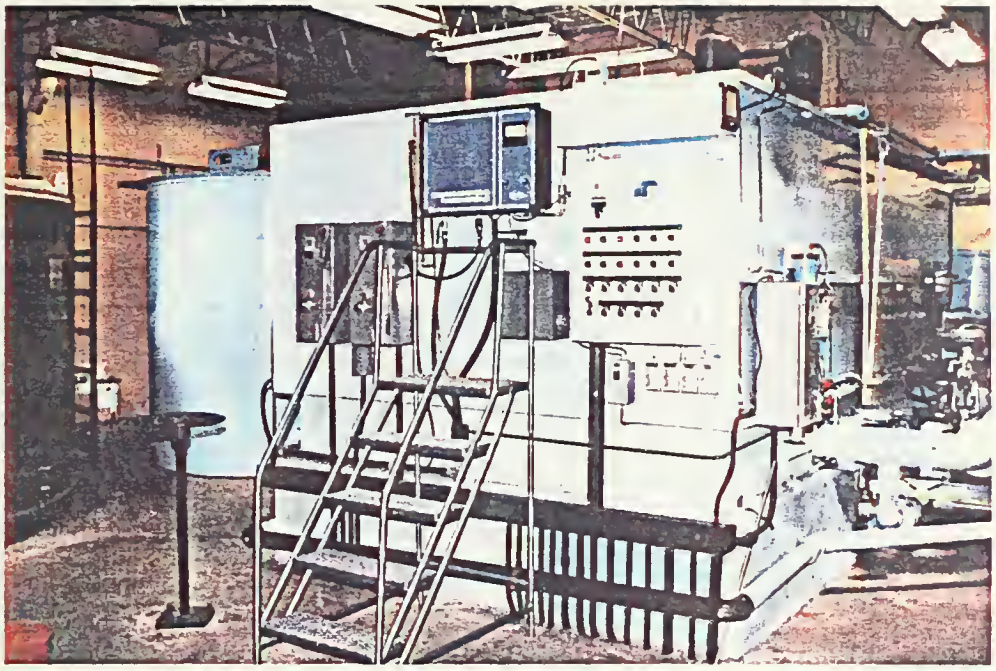


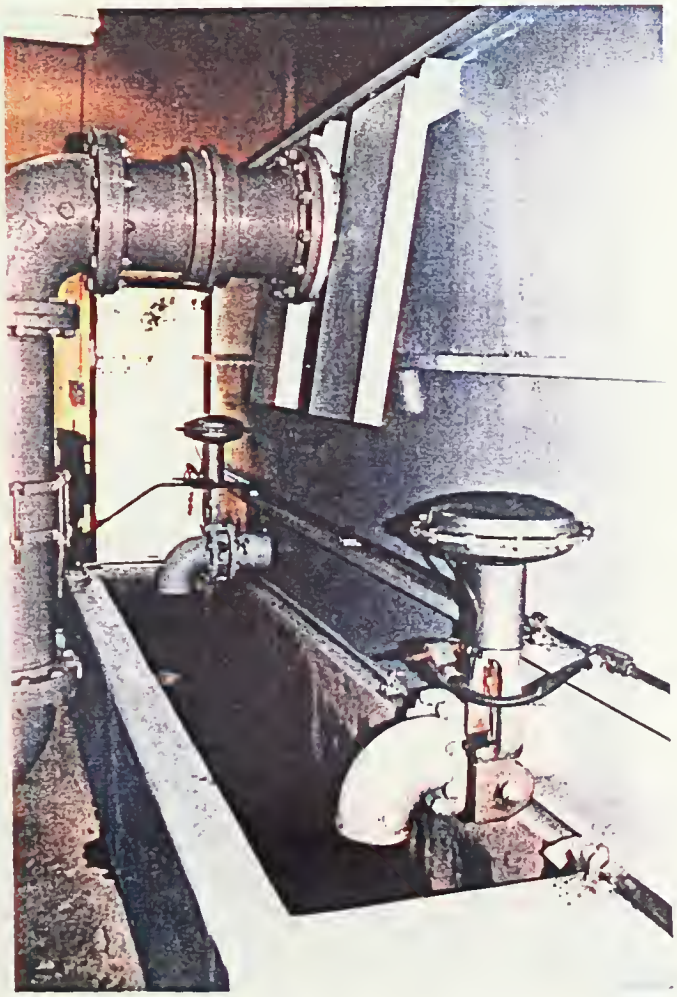
Low Lift Pumps and Flocculation Tank. Alum and Polymer dosing point at far right into tee.

High Lift Pumps with alum storage tank in background.

Above:
Unused Soda Ash Tank (right)
Polymer System (centre)

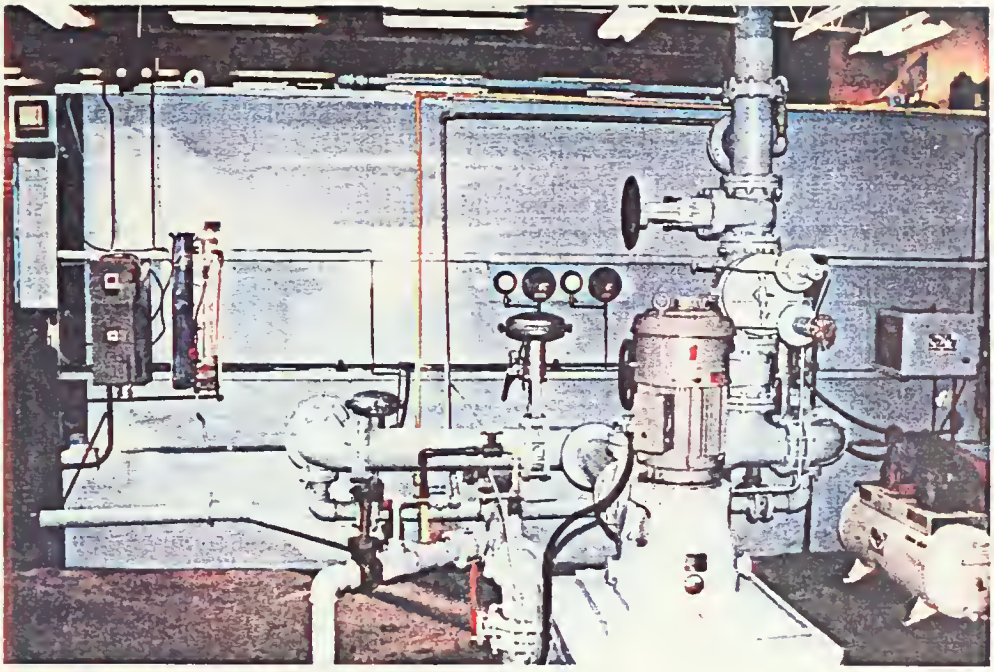
Left:
Polymer System with emergency generator in background.

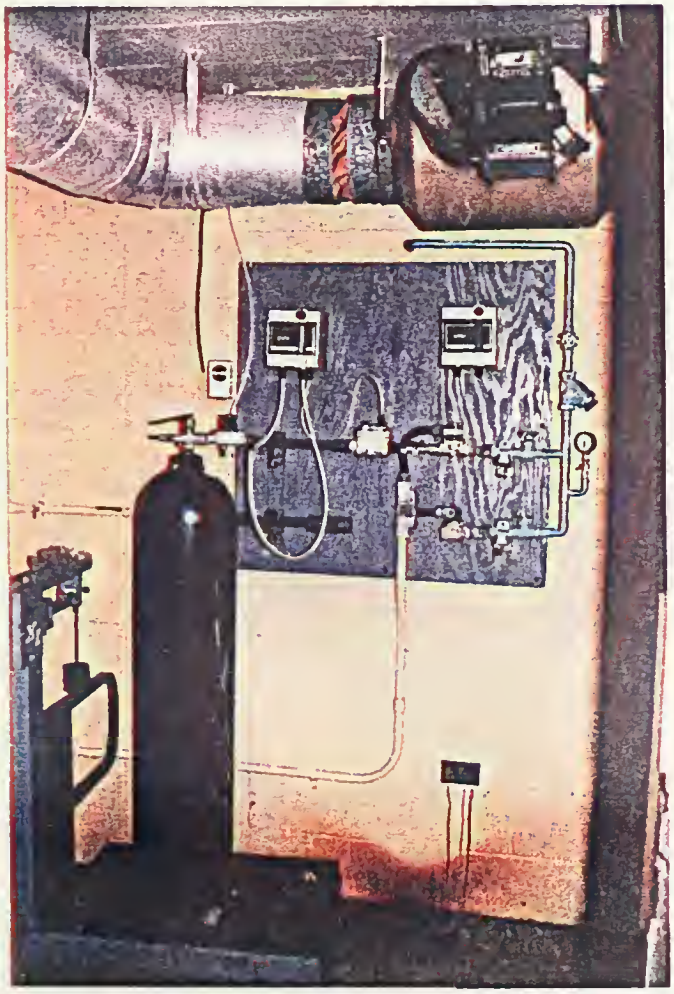




Above:
Microfloc AQ40 Package Plant. Flocculator Tank is in background. Filter Effluent and Backwash Piping on right.

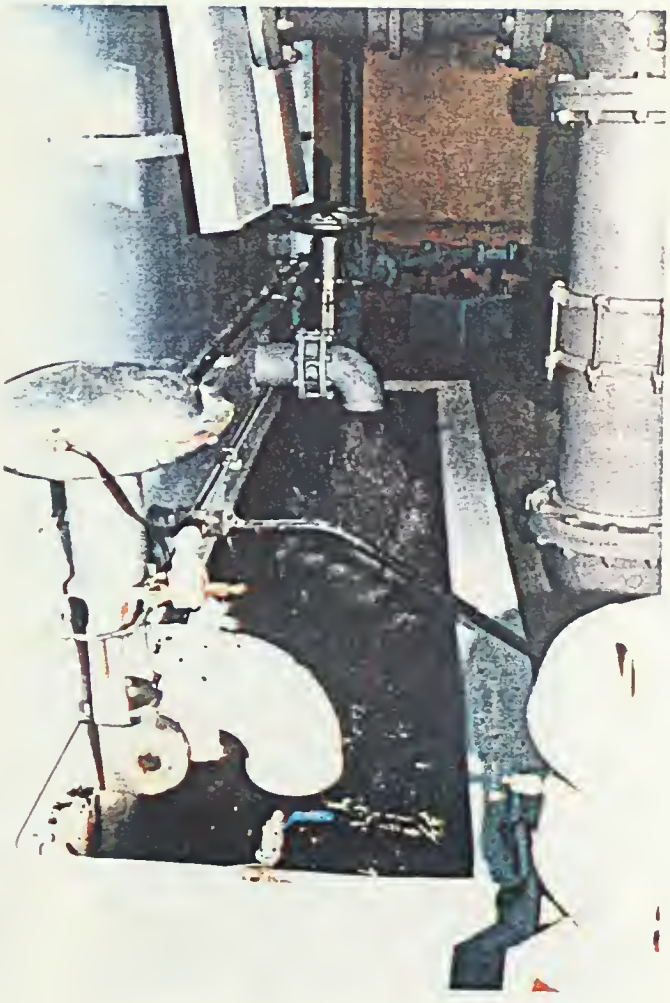
Left:
AQ40 Waste Valves





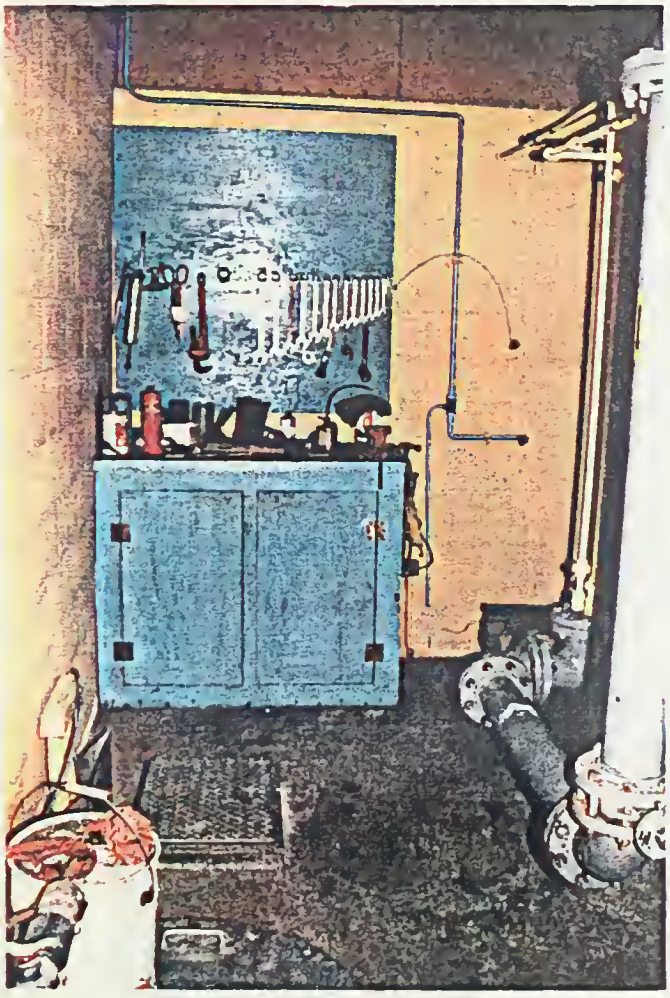
Above:
Backwash Pump and
Emergency Backwash
from High Lift Header

Left:
Chlorine Room. Note
only post chlorination
provided.



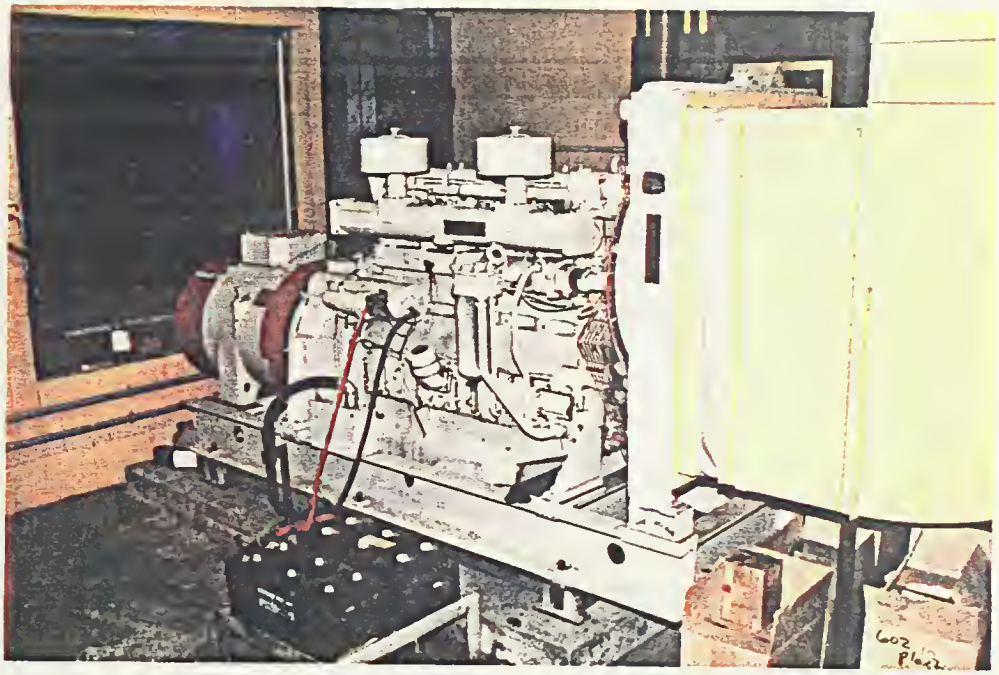
Above:
Reg Foubert Skimming Filter during backwash

Left:
Backwash and clarifier sludge discharge. Wastewater is black because of PAC.



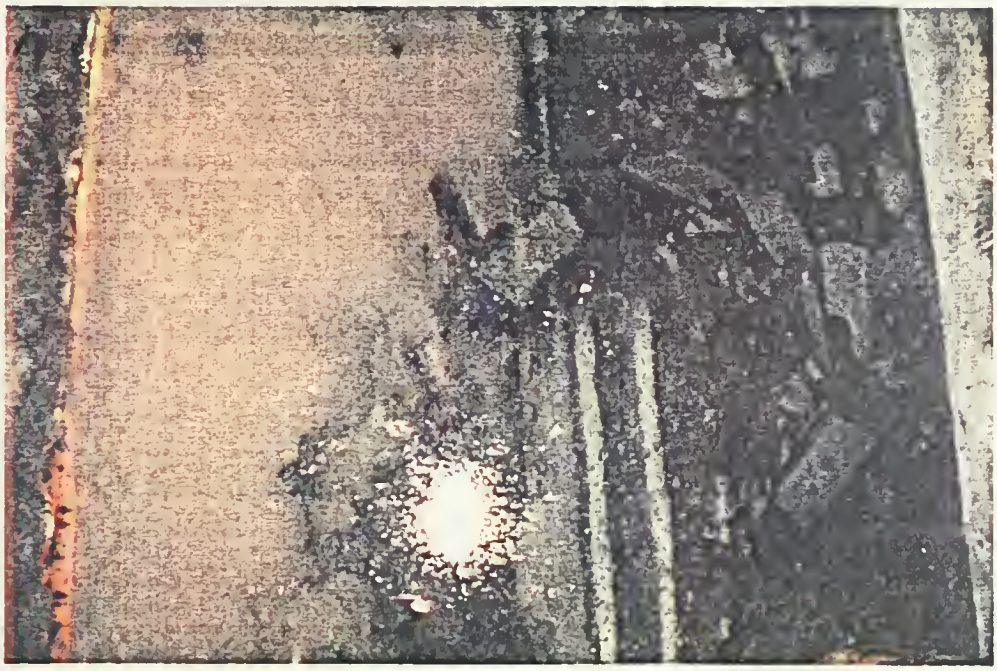
Above:
Lab and Office

Left:
Workbench. Low lift discharge pipe on right with Static Mixer in horizontal run.



Above:
Diesel Generator

Left:
PAC room



Water above filter. Filter shut down overnight. Floating plates on right have glassy appearance.

Material skimmed from surface of filter during backwash.

APPENDIX IV

UTILITY MONITORING REPORTS

Ministry of the Environment
Ontario

Water Treatment Plant

UTILITY MONITORING SYSTEM

B1

Municipality MITCHELL'S BAY WATER SYSTEM
Project Name 5.0198.72
Project Number _____ Month JAN Year 1986
Project Location _____

Superintendent/Chief Operator _____

B1

Enter comments on the back of this page.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total	Avg.
FLOWS RAW WATER 10^3m^3	.060	.054	.070	.092	.069	.053	.067	.063	.057	.074	.058	.063	.050	.050	.050	.047	.071	.070	.067	.053	.056	.058	.053	.084	.057	.055	.052	.078	.087	.058	.064	1.947	
TREATED WATER* 10^3m^3	.060	.054	.056	.092	.069	.053	.053	.063	.058	.068	.053	.063	.050	.050	.050	.050	.047	.057	.070	.067	.053	.056	.058	.053	.070	.057	.055	.052	.064	.087	.057	.060	1.947	.063
MAX. 1-HR. RATE $10^3m^3/d$																													H				
RAW WATER (CHEMICAL)																																	
HARDNESS (31) mg/l																																	
ALKALINITY (1) mg/l																																	
IRON (23) mg/l																																	
CHLORIDE (16) mg/l																																	
pH (FIELD)						7.5																											7.5
CONDUCTIVITY (15) µmhos/cm																																	
FLUORIDE (24) mg/l																																	
TOTAL P. (47) mg/l																																	
DISSOLVED P. (46) mg/l																																	
N- (39) mg/l																																	
TKN (42) mg/l																																	
NITRITE (00) mg/l																																	
NITRATE (41) mg/l																																	
CHLOROPHYLL A µg/l																																	
CHLOROPHYLL B µg/l																																	
RAW WATER (PHYSICAL)																																	
TURBIDITY (FIELD) FTU	9.0	8.4	9.2	8.1	7.5	7.5	7.5	7.0	7.5	7.0	6.7	6.5	6.0	5.5	5.5	5.5	5.0	4.5	5.0	6.0	7.0	5.0	11.2	15	30	35	38	85	25	14	23		12.4
COLOUR (17) HAZEN U.																																	
TEMPERATURE (FIELD) °C	6	7	6	6	7	6	6	6	6	6	6	6	7	7	6	7	6	7	7	7	6	6	7	5	5	5	5	5	4	5	6		6.1
ALGAE (TOT. ASU/ml)																																	

MOE 0641(G) 1/84 (P. 1 of 2)

*RECORD FLOW ACTUALLY LEAVING PLANT

METER READING 4277.000

Ministry of the Environment
Ontario

Water Treatment Plant

UTILITY MONITORING SYSTEM

B2

B2

Municipality MITCHELL'S BAY WATER SYSTEM
Project Name 5-0188-73
Project Number _____ Month Nov Year 1984
Project Location _____
Superintendent/Chief Operator _____

Enter comments on the back of this page.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total	Avg.
DISINFECTION																																		
PRE	Cl_2 USED	kg																																
	Cl_2 DOSAGE	mg/l																																
	AVG. Cl_2 RESI.	mg/l																																
	SODIUM HYPO.	kg																																
POST (OR SINGLE POINT)	Cl_2 USED	kg																															5.9	
	Cl_2 DOSAGE	mg/l																																3.0
	AVG. Cl_2 RESI.	mg/l (Fluff)	.7	.6	.8	.9	.8	.7	.8	1.0	1.0	.8	.8	.8	.6	.7	.8	.9	.9	.8	1.0	1.0	1.1	1.1	1.1	1.1	1.0	.5	.5	.7	.9	.9	.6		.84
	MAX. Cl_2 RESI.	mg/l																																
	MIN. Cl_2 RESI.	mg/l																																

RAW WATER (BACTERIOLOGICAL) INDICATE NUMBER OF SAMPLES IN EACH CLASS

TOTAL COLI	0-100	/100 ml							1							1							1							1			4	
	101-5000	/100 ml																																
	>5000	/100 ml																																
FECAL COLI.	0-10	/100 ml							1							1							1										3	
	11-500	/100 ml																													1		1	
	>500	/100 ml																																
FECAL STREP.	0-1	/100 ml							1							1																	2	
	2-50	/100 ml																					1							1			2	
	>50	/100 ml																																

TREATED WATER (BACTERIOLOGICAL) INDICATE NUMBER OF SAMPLES IN EACH CLASS

TOT. COLI.	PRESENT																																	
	ABSENT*								1							1							1							1			4	
	1-4*	/100 ml																																
	>4	/100 ml																																
FECAL COLI.	PRESENT																																	
	ABSENT*																																	
FECAL STREP.	PRESENT																																	
	ABSENT*																																	
STD PLATE COUNT	0-500	/ml																					1							1			2	
	>500	/ml																																

*SAMPLES WITH RESULTS OF L2, L4 OR ZERO SHOULD BE ENTERED IN THE 'ABSENT' ROW.

Cl_2 SCALE 116 (1.0 NEW EYE)

MOE 0641(H) 1/84 (P.1 of 2)

Ministry of the Environment
Ontario

Water Treatment Plant

UTILITY MONITORING SYSTEM

B3

B3

Municipality MITCHELL'S BAY WATER SYSTEM
Project Name 5 0198 73
Project Number _____ Month JAN Year 1996
Project Location _____

Enter comments on the back of this page.

Superintendent/Chief Operator _____

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total	Avg.
DISTRIBUTION SYSTEM (BACTERIOLOGICAL) INDICATE NUMBER OF SAMPLES IN EACH CLASS																																	
COLI. PRESENT								1							1							1							1			4	
COLI. ABSENT*																																	
COLI. 1-4* /100 ml																																	
COLI. >4 /100 ml																																	
FECAL COLI. PRESENT																																	
FECAL COLI. ABSENT*																																	
FECAL STREP. PRESENT																																	
FECAL STREP. ABSENT*																																	
*SAMPLES WITH RESULTS OF L2, L4 OR ZERO SHOULD BE ENTERED IN THE ABSENT ROW.																																	
STD PLATE COUNT 0-500/ml								1							1																	2	
STD PLATE COUNT >500/ml																																	
TREATED WATER (CHEMICAL)																																	
HARDNESS (31) mg/l																																	
ALKALINITY (1) mg/l																																	
IRON (23) mg/l																																	
CHLORIDE (16) mg/l																																	
CHLORINE (FIELD)																																	
CONDUCTIVITY µmhos/cm (B)																																	
FLUORIDE (.24) mg/l																																	
DISSOLVED P mg/l																																	
NH 4 mg/l																																	
TKN mg/l																																	
NITRITE mg/l																																	
NITRATE mg/l																																	
ALUMINIUM mg/l																																	
TREATED WATER (PHYSICAL)																																	
AVG TURBIOITY (FIELD) FTU	.32	.27	.20	.35	.35	.40	.36	.40	.43	.40	.42	.47	.40	.40	.42	.45	.43	.42	.44	.45	.43	.43	.40	.35	.37	.39	.35	.31	.32	.39	.35		.38
No SAMPLES < 1 FTU																																	
MAX TURBIOITY FTU																																	
AVG COLOUR (17) HAZEN U.																																	
No SAMPLES < 5 HAZEN U.																																	
MAX COLOUR HAZEN U.																																	
TEMPERATURE FIELD °C	10	10	11	11	11	10	10	10	11	11	11	11	11	10	11	12	11	13	12	11	12	11	11	12	11	11	10	10	10	10	10		10.8

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Ministry of the Environment
Ontario

Water Treatment Plant
(or Well)

UTILITY MONITORING SYSTEM

B4–C4

Municipality MITCHELL'S BAY WATER SYSTEM

Project Name 5-0183-73

Project Number _____ Month JUN Year 1986

Project Location _____

Superintendent/Chief Operator _____

B4–C4

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total	Avg.
PROCESS CHEMICALS																																		
AL (LIQUID)	m³																																LO.1	
AL (SOLID)	kg																																	
ALUM. DOSAGE	mg/l	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	120	120	120	120	50	50	50		59.0
SODIUM SILICATE	kg																																	
SOD. SIL. DOSAGE	mg/l																																	
SODIUM BICARB.	kg																																	
SOD. BICARB. DOSAGE	mg/l																																	
*POLYMER	kg	.46						.46									.46							.46							.46		2.30	
POLYMER DOSAGE	mg/l	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	6	.6	.6	.6	.6	.6	.6	.6	.65	.65	.65	.65	.65	.75	.75	.75	.75	.75	.75	.75		.64
ACT. CARBON	kg	.22	.29	.30	.40	.35	.30	.35	.20	.30	.39	.36	.25	.25	.25	.25	.20	.33	.24	.30	.25	.25	.25	.25	.40	.35	.25	.25	.35	.30	.35	.39	9.22	
ACT. CARB. DOSAGE	mg/l	3.7	5.3	5.4	9.9	5.0	5.7	5.2	3.2	5.2	5.3	6.2	4.0	5.0	5.0	5.0	4.3	6.7	5.4	4.5	4.5	4.5	4.3	4.3	5.7	6.1	4.5	4.5	5.5	7.4	6.0	5.3		4.9
FLUORIDE CHEMICALS	H_2SiF_6	kg																																
	Na_2SiF_6	kg																																
	NaF	kg																																
	F DOSAGE	mg/l																																
LIME		kg																																
LIME DOSAGE		mg/l																																
SODA ASH		kg																																
SODA ASH DOSAGE		mg/l																																
POTASSIUM PERM.		kg																																
POT. PERM. DOSAGE		mg/l																																
AMMONIA		kg																																
AMMONIA DOSAGE		mg/l																																
SULPHUR DIOXIDE		kg																																
SUL. DIOX. DOSAGE		mg/l																																

MOE 0641(J) 1/84 (P 1 of 2)

Ministry of the Environment
Ontario

Water Treatment Plant
(or Well)

UTILITY MONITORING SYSTEM

B5-C5

Municipality MITCHELL'S BAY WATER SYSTEM
Project Name 5-0183-73
Project Number _____ Month MAY Year 1986
Project Location _____
Superintendent/Chief Operator _____

B5-C5

TYPE OF FILTER: HIGH RATE

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total	Avg.
FILTRATION																																	
TOT. No. OF FILTERS IN USE	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		2
INF. TURBIDITY FTU	9.1	8.4	9.2	8.1	7.5	7.5	7.5	7.0	7.5	7.0	6.7	6.5	6.0	5.5	5.5	5.5	5.0	4.5	5.0	4.0	7.0	5.0	12.0	15.0	30.0	35.0	38.0	33.0	25.0	24.0	23.0		12.4
EFF. TURBIDITY FTU	.25	.25	.22	.28	.25	.23	.27	.22	.25	.25	.25	.27	.25	.27	.23	.22	.20	.24	.28	.20	.20	.25	.25	.25	.35	.32	.25	.24	.25	.25	.22		.25
AVG. FILTER RUN HRS.	2.2	2.9	3.0	4.0	3.5	3.0	3.5	2.0	3.0	3.9	3.6	2.5	2.5	2.5	2.5	2.0	3.8	2.4	3.0	2.5	2.5	2.5	2.5	4.0	3.5	2.5	2.5	3.5	3.0	3.5	3.9		3.0

FILTER BACKWASH

VOLUME	$10^3 m^3$		.014			.014		.014									.014							.014			.014			.014	.098	
% OF TREATED FLOW			25.0			24.7		23.1									26.0							20.4			22.6			23.5		23.5
BOD	mg/l																																
SS	mg/l																																
TOT. P.	mg/l																																
TKN	mg/l																																

CLARIFIER SLUDGE

VOLUME	m^3																																
BOD	mg/l																																
SS	mg/l																																
TOT. P.	mg/l																																
TKN	mg/l																																

COMMENTS: